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Original Articles

The Treatment of Adherent Placenta

Because of the importance of this serious complication of parturition we felt that an expression of opinion on the part of men of wide experience in midwifery would be of particular interest to many of our readers. For this reason we sent a series of questions to a number of men recognized as competent to speak with authority, and are glad to present their interesting and practical replies.

The questions follow:

1. What is your routine or usual treatment of adherent placenta?
2. Does manual manipulation necessarily involve infection as a rule?
3. Do you practice manual removal in certain cases; if so, under what circumstances?
4. Do you advise so radical a procedure as abdominal operation for removal of the adherent placenta; if so, under what circumstances?
5. Do you think in the absence of bleeding or evidence of infection it is a good plan to wait for separation, and, if there is evidence of infection, what measures do you take?

By Edward P. Davis, M.D.,

Professor of Obstetrics in the Jefferson Medical College, Philadelphia.

One of the most trying and in some ways dangerous complications of parturition is adhesion of the placenta.

Cases of genuine adhesion of the placenta are extremely rare. A placenta cannot be strictly said to be adherent until forty-eight hours have passed after the birth of the child and the placenta is still retained.

Whatever causes chronic endometritis before conception predisposes to adhesion of the placenta when pregnancy occurs. The syphilitic endometritis which accompanies the presence of a syphilitic ovum is alleged to be a frequent cause.

The dangers of this condition are septic infection and hemorrhage. Of these hemorrhage is the immediate danger; septic infection the more remote.

So far as treatment is concerned, that treatment is best which aids the natural processes by which the placenta is separated and expelled. All placentæ cohere to the maternal decidua through the chorion and fetal decidua. When the child is expelled the area of placental attachment is immediately lessened; placenta and uterine decidua are separated by the extravasation of blood and serum; the placenta becomes a foreign body and makes its way gradually into the lower segment and cervix, whence it is expelled by the contractions of the abdominal muscles. The process of separation in normal cases is a gradual one and may occupy an hour without detriment to the patient. Where placental separation is prolonged a process of aseptic necrosis occurs in the cellular elements of the maternal decidua and the fetal tissues, while the clots in the uterine sinuses effectually prevent the access of bacteria to the mother's blood-stream. In the majority of cases bacteria from the vagina and cervix do not enter the uterine cavity until three or four days after labor, and hence during this time the placenta may separate gradually without infection.

Hemorrhage will occur if the blood does

not clot promptly in the uterine sinuses, and if the uterus does not contract promptly after the expulsion of the child.

In view of the conditions which are present in normal separation of the placenta, when the placenta is genuinely adherent we should endeavor to bring about an aseptic necrosis of the cellular elements in the maternal decidua of the placenta, which is nature's method of loosening the placenta from the uterine wall. If the uterus is kept well contracted during this process and there is free drainage for the lochia, the placenta will separate without danger to the mother.

To avoid retention of the placenta sufficient time must be given for its separation after the birth of the child. Premature efforts to force out the placenta are injurious and dangerous. What the physician may do if the placenta is retained after the birth of the child depends very much upon his skill, experience, and facility. If he is not especially skilled in obstetric manipulation, his patient in a private dwelling without hospital facilities, so long as there is no hemorrhage it is best not to invade the uterine cavity; 1/40 gr. strychnine and 20 drops fluid extract of ergot may be given every four hours for three doses. When the patient feels the pain of uterine contraction she should be urged to bear down with the abdominal muscles, and thus the placenta will usually be expelled. Should hemorrhage occur the physician must interfere.

With a patient in hospital with aseptic surroundings, many obstetricians remove the retained placenta manually under partial anesthesia if it is not promptly expelled. If this be skilfully done and under strict asepsis the writer has never seen harm follow. A tendency to hemorrhage must be combated by the hypodermic use of ergot or pituitrin; strychnine and ergot by the mouth should be given for two days after. Should there be a persistent tendency to uterine relaxation the uterus should be thoroughly packed with 10-per-cent iodoform gauze.

Where the placenta is genuinely adherent, in hospital and under anesthesia, the gloved hand may be carefully carried into the uterus and the placenta gently and as thoroughly as possible peeled off from the uterine wall. No adherent placenta is ever entirely removed by manual interference. Portions of placental or chorionic tissue will remain. Their presence may cause hemorrhage and infection. To obviate this after removing so much of the placenta as possible, the uterus should be thoroughly packed with 10-per-cent iodoform gauze. It should be placed in proper position, with the cervix back and the fundus forward, and the vagina moderately packed with sterile or bichloride gauze; 1/40 gr. strychnine and 10 drops fluid extract of ergot should be given four times in twenty-four hours. Unless the uterus forces the gauze out it should be removed in forty-eight hours and the uterus thoroughly irrigated with 1/2 per cent lysol. Placental remnants will usually be found adherent to the gauze. After this the uterus should be kept in normal position and strychnine and ergot given in tonic doses for a week. Should considerable hemorrhage occur it would be necessary to renew the packing.

By J. Clifton Edgar, M.D.,

Professor of Obstetrics in the Cornell University Medical College, New York.

1. My routine or usual treatment of adherent placenta.

In the absence of hemorrhage (partial separation) I am more conservative than ever before. Recently (November, 1922) I waited three hours before doing a manual extraction.

My usual treatment, in the absence of serious hemorrhage, is to carefully use the Credé method, being most careful to time application of Credé to contractions of the uterus. Failing in this I add pituitary extract, and continue *careful* Credé as above. I thus wait for at least two hours. I never employ ergot. In the presence of serious bleeding, I, of course, immediately resort to manual removal, should the Credé method fail.

2. Does manual manipulation necessarily involve infection as a rule?

I do not understand whether you mean external (Credé) or internal.

External manipulation (Credé), in my opinion, does not necessarily predispose to infection. But I teach that too vigorous Credé and too frequent manipulation may reduce the resistance of the uterine tissue and predispose to infection. Internal manipulation always carries a risk of infection; and to avoid this, as far as possible, I personally cleanse the external genitals, especially the vulvar canal, and thoroughly cleanse the vagina myself with tincture of green soap. Then before introducing my hand into the uterus I put on a fresh pair of rubber gloves.

4. In thirty odd years of obstetric practice I have never met a case in which I considered an abdominal operation necessary for adherent placenta.

5. In the absence of bleeding or infection, as above stated, I wait several hours for separation. Many, in my experience, have thus separated.

In the presence of infection I proceed as in its absence, but pay the strictest attention personally to the cleansing of the vulvar canal and vagina up to and about the vaginal fornices with tincture of green soap and gauze wipes.

In every case of manual removal I always irrigate the uterine cavity thoroughly with several quarts of normal salt solution, or plain sterile water.

By J. Whitridge Williams, M.D.,
Professor of Obstetrics in the Johns Hopkins University, Baltimore.

It gives me great pleasure to answer your questions as well as I can.

1. What is your routine or usual treatment of adherent placenta?

Ans. In my experience adherent placenta is extraordinarily rare, possibly occurring once in one thousand deliveries. When we encounter it we pursue as conservative a course as possible, and do not think of introducing the hand into the uterus until two hours have elapsed after the birth of the child, and attempts at expression by Credé's method under anesthesia have proved futile. Interference before this time is practiced only in the presence of serious hemorrhage.

2. Does manual manipulation necessarily involve infection as a rule?

Ans. Manual manipulation necessarily involves a greater risk of infection than in the ordinary obstetrical operations; as in the former, the hand comes in direct contact with the placental site with its open and thrombosed vessels, so that bacteria which may be introduced find unusually favorable conditions for growth and extension; whereas, in the ordinary operations, the hand is introduced into the amniotic cavity, and whatever bacteria may have been carried up with it are cast off when the placenta and membranes are extruded.

3. Do you practice manual removal in certain cases; if so, under what circumstances?

Ans. This is answered under question 1.

4. Do you advise so radical a procedure as abdominal operation for the removal of adherent placenta; if so, under what circumstances?

Ans. Up to the present time I have never felt it necessary to attack an adherent placenta by the abdominal route. Recent investigations, however, have shown that in certain cases of true adherent placenta removal of the uterus offers the only hope of satisfactorily coping with the condition. In such cases, owing to a relative absence of the decidua, the chorionic villi have deeply invaded the muscular wall of the uterus, and have brought about such conditions that manual removal can only be partially accomplished, and if attempted leaves *in utero* adherent tags of placental tissue which will give rise to hemorrhage or infection. Such conditions, however, are very rare and should in great part be regarded as pathological curiosities, for I have never met with an instance in my

experience covering more than 25,000 deliveries.

5. Do you think in the absence of bleeding or evidence of infection, it is a good plan to wait for separation, and, if there is evidence of infection, what measures do you take?

Ans. In the absence of bleeding or infection, I should not think of introducing the hand into the uterus for at least two hours after delivery; then if the Credé method under anesthesia fails, after repeated attempts, I would introduce the hand and attempt manual removal. If, however, this did not succeed, or could only be imperfectly accomplished, I should then consider the advisability of removing the uterus for the reasons given above.

What you mean by "evidence of infection" is not quite clear. If it is meant that the patient had fever during delivery, I should think the sooner the entire process is completed, the better. On the other hand, if the infection developed postpartum and tags of placental tissue were found in the uterus, I should, generally speaking, attempt their removal rather than think of removing the uterus.

By Barton Cooke Hirst, M.D.

Professor of Obstetrics in the Medical Department of the University of Pennsylvania, Philadelphia.

In answer to your questionnaire I would reply serially as follows:

No. 1. My usual practice is manual detachment and extraction, which is usually practicable without much difficulty. If there is any difficulty in detachment and removal of the placenta, I pack the uterus for twenty-four hours and make another attempt at extraction on the removal of the gauze at the end of that time, although often this is unnecessary, as the placenta has become detached meanwhile and then is easily extracted or expressed.

Manual manipulation done properly does not involve infection. The occurrence of infection as a consequence of this procedure, or of an attempt to remove the placenta, is an indication of faulty technique.

My answer to No. 3 is given in reply to question No. 1. I also attempt the manual removal with aseptic precautions, and have succeeded without difficulty in the majority of cases. I have never seen a case in which an abdominal section was necessary for the removal of adherent placenta, and I cannot imagine a case in which such a procedure would be required, in the hands of any one with adequate training in obstetrics.

No. 5. In the absence of bleeding or evidence of infection, it is unquestionably a good plan to wait for separation. The placenta has been retained in the uterus in reported cases for weeks and even months without harm. If there is evidence of infection, my procedure is best described by my conduct in a case seen in consultation within the last few days An accessory placenta was retained in the uterus for twelve days; during the whole of this time there was an irregular fever rising to 102° as a maximum. I extracted this adherent accessory placenta partly by manual means and partly by the use of a placental forceps. The complete removal of the placenta was followed by an irrigation of the uterus with one drachm of Lugol's solution to a pint of water. All symptoms of infection immediately disappeared and the patient is making an excellent recovery.

I have had a great many such cases treated in the same manner and with equally good results.

By Richard C. Norris, M.D.,

Physician in Charge of the Preston Retreat, Philadelphia.

Adherent placenta is usually partial and accompanied by profuse, repeated, and dangerous loss of blood. Complete adhesion (placenta accreta) is much rarer, and is not associated with grave loss of blood. Its diagnosis usually is made when the uterus, failing to contract and retract, also

fails to even partially separate the placenta, and when repeated attempts at manual expression (Credé), which should only be made after separation has occurred, have been unsuccessful, or worse, have started acute inversion of the uterus. To confirm the diagnosis, exploration of the uterine cavity is necessary. The dangers of manual separation and removal are hemorrhage and shock, from which many women die, and sepsis, an even greater danger. One-third of such cases are said to show a septic convalescence, and these have had a mortality of about 7 per cent.[1]

At the Preston Retreat in 6450 consecutive cases it has been necessary to introduce the whole hand into the uterus to separate a partially or completely adherent placenta nineteen times. Of these six were completely adherent, a frequency of complete adhesion of about 1 in 1000 labors. In the nineteen cases, four developed mild sapremia during convalescence, requiring intra-uterine disinfection. Of two more serious cases one developed femoral phlebitis. There was no maternal mortality.

Prior to the antiseptic and aseptic eras manual separation of the placenta was believed to be the most dangerous operation in obstetric practice. It is, therefore, not altogether surprising that the application of surgery to this condition has been suggested. The most striking advances in obstetric practice during the past two decades have been surgical. This is particularly true of the hemorrhages, the most tragic of all obstetric complications, since they are the least foreseen and cannot always be prevented by prenatal care, which can prevent other obstetric disasters, and which now is generally appreciated and practiced.

The surgical treatment of the serious hemorrhages of placenta prævia and abruptio placentæ has saved many mothers and some children who otherwise would have perished, as they frequently did in the pre-surgical era. All progressive movements, however, must have an "insane fringe," and with surgical progress in obstetrics there are always some, on this fringe, who exploit surgical treatment until the more reflective partisans finally establish surgical intervention upon a firm scientific and clinical basis.

The pathological anatomy of complete adhesion of the placenta discloses an absence of the spongy layer of the decidua, the villi of the placenta being directly in contact with and adherent to the muscle fibers of the uterus and their interlacing connective tissue. At autopsy it is almost impossible to separate the placenta without injury to either the placental or uterine tissues. This close union explains the great danger of traumatism to the uterine wall at the placental site during manual intra-uterine separation, and readily explains the frequency of grave infection, the operation being conducted through the vulvar and vaginal canals, the sterilization of which cannot be assured. Partial adhesion of the placenta will never warrant surgical treatment. The practical objection to hysterotomy for complete adhesion of the placenta is the fact that absolute diagnosis of this complication is usually impossible without exploration of the uterine cavity, and this having been made its subsequent dangers of infection, while not so great as when attempts at separation have been made, are not removed by hysterotomy. As a matter of fact they are increased by the added danger of peritonitis following infection spreading through the uterine wound, if a corporeal section of the uterus is made. The cervical section will require manual separation of the placenta with the same blind tearing loose of the adherent tissues as is practiced when the hand operates through the birth canal, its only advantage being avoidance of traversing the potentially infected vagina and vulva. That advantage is not enough to warrant its use.

Having excluded hysterotomy we must rely on most careful disinfection of the birth canal and manual separation and

[1] Hirst's "Obstetrics," 1898, p. 399.

removal through the vagina. When shall this be done? If the hemorrhage is quite profuse, the uterus not retracted, and contractions are not occurring, it must be done at once. Following a careful preliminary disinfection, especially of the vulva, then of the vagina and cervix, rapid applications of iodine or .2-per-cent mercurochrome solution after douching are made. Fresh rubber gloves are to be worn, the gloved hand and fingers being loosely covered with a single layer of gauze handkerchief. Light anesthesia, preferably gas and oxygen, should be the rule. Having entered the uterus the placental area is explored and the partially separated margin is located, and the separation is begun at this point, working between the membranes and uterus if possible, upward from below, downward from above, or laterally when the lateral margin is the separated area.

When the placenta is located on the anterior wall it will often be found advantageous to turn the patient upon her side, the exploring hand remaining in the uterus, while the patient's leg is carried over the operator's shoulder. The usually recommended "paper cutter" motion of the fingers and hand is employed, assisted by counter-pressure of the hand on the abdomen. When necessary to pinch off tightly adherent areas, the pinching should be toward the placenta, bearing in mind always to protect the uterine wall from traumatism. Having separated the placenta it is grasped by the hand, a full dose of pituitrin and ergot should be given, and the placenta and hand withdrawn when the uterus contracts. A firm intra-uterine and vaginal tampon to the vulva should be applied when the uterus fails to promptly contract and retract.

In the cases accompanied by little or no bleeding in which the placenta is found completely adherent by the exploring hand, it is best not to attempt immediate separation. The wiser course is to cut the cord at the cervix, tampon the birth canal from fundus to vulva to prevent hemorrhage or acute inversion, give the patient ergot and pituitrin, repeating the latter in small doses (3 to 5 minims) every fourth hour, while the patient is carefully watched for forty-eight hours, when, under light gas and oxygen anesthesia, the tampon is removed, the uterus douched, the placenta is removed manually, and the cavity of the uterus swabbed with half-strength tincture of iodine or mercurochrome solution (2 to 5 per cent).

It should be remembered that the uterine cavity in practically all puerperæ contains pathogenic germs after the fifth day of the puerperium, and for that reason delay in removing a completely adherent placenta should not be longer than forty-eight hours, in order that nature's barrier to infection at the placental site, usually set up by the fifth day, should be well under way before the time when infective bacteria are commonly found in the interior of the womb. The fact that adherent placentæ have sometimes been retained in the uterus over long periods of time with no serious results should not delay removal beyond forty-eight hours. The former dangers of manual removal of the partly or completely adherent placenta can be overcome by a careful technique which demands the use of sterile rubber gloves, careful disinfection of the lower birth canal, and an operating hand conscious of the possible traumatic injuries to the uterine wall.

By John Osborn Polak, M.D.,

Professor of Obstetrics and Gynecology, Long Island College Hospital, Brooklyn, New York.

In answer to your inquiry regarding adherent placenta, I have very definite views and practices, which have been carried out in my clinic for a number of years.

First, I believe that a true adherent placenta is extremely rare; that if it is completely adherent the patient does not bleed, because she cannot, as the placental site is closed by the placenta. In such a case we have waited several days for separation, and have invariably found, except in one instance, that the placenta separated spontaneously with the usual signs of sepa-

ration—such as bleeding, rise of the fundus, change of the shape of the uterus, etc. Most of the so-called adherent placentæ are really retained placentæ.

In deciding on the course of treatment in any case, the period of pregnancy, the amount of hemorrhage, the presence of sepsis and the condition of the cervix should be determining factors. In the early months, without bleeding or sepsis, we have found that an intra-uterine pack, plus a firm vaginal pack, will almost invariably separate the placenta. This is true also when there is partial separation, and sepsis is absent.

In the cases of bleeding, with partial separation, and the woman septic, a firm vaginal pack against the cervix will invariably lead to complete separation, and also control the bleeding.

I do not believe in the clean case that aseptic manual manipulation leads to sepsis, provided the same precautions are taken in entering the uterus as would be taken in entering the abdomen.

I have, in one instance, where the placenta did not come away and separate, as a result of the intra-uterine pack, removed the placenta by a hysterotomy incision, and finding that it could only be removed piecemeal, because of its pathological adhesion, followed my hysterotomy by hysterectomy.

I can conceive that there may be such pathological changes as to necessitate radical operation.

One thing is certain, that the general teaching that the uterus should be manipulated and Credé's used before the signs of separation have taken place, has produced many partial separations and hemorrhage which have been costly to both the woman and physician.

Protein Therapy, with Special Reference to Skin Diseases and Syphilis*

BY JOSEPH L. TENENBAUM, M.D.
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The remarkable progress in immunology made within the last three decades fostered the conviction that the reactions which take place in the infected organism are strictly specific. However, numerous observations have been published since which are not in accordance with the accepted rules of strict specificity.

A few years following Koch's remarkable discoveries concerning tuberculin vaccination, Krehl and Matthes (1895) succeeded in provoking typical focal reactions in tubercular lesions with non-specific deuteroalbumin injections.[1] At the same time Rumpf claimed good results in typhoid treated with pyocyaneus vaccines, and later on Kraus with bacterium coli cultures. Other instances of successful heterovaccination have been published since.[2] In 1920 Bingel reported his experiments in a large number of diphtheria cases which, subjected to treatment with "empty" (non-immunized) horse serum, were followed by insignificant differences in the rate of mortality, as compared with cases subjected to routine antitoxin treatment.[3] This experiment,. though not confirmed by others, may be supplemented by observations reported by Roux,[4] who has found concentrated doses of diphtheria antitoxin less effective than the less concentrated sera, which, as a matter of fact, are poorer in specific elements and more abundant in non-specific proteins. This suggests that besides the specific there is a non-specific element in the vaccines and sera which has not been recognized by the immunologist.

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SPECIFIC AND NON-SPECIFIC PROTEINS.

It has been observed that a guinea-pig which has received an injection of 5 to 10 cc bouillon or a solution of aleuronat into the abdominal cavity will tolerate a multiple dose of typhoid bacilli, while an animal not subjected to previous non-specific treatment will succumb to a much smaller (fatal) dose. Microscopical examination reveals the presence of a leucocytosis in the first animal. Apparently the leucocytes, which may be regarded as the chief factor in parenteral digestion,[5] being mobilized by the non-specific injections, annihilate the specific invaders before the period of incubation has elapsed.[6] Thus non-specific foreign proteins, though lacking immunizing properties which are shared by specific antigens, nevertheless exert a beneficial influence on the process of infection through non-specific stimulation of the organic forces. This reaction, in contradistinction to specific immunity, has been termed non-specific resistance.[7]

In cases of immunization we have to deal with two factors, one of which is strictly specific (antigenic), while the other is non-specific ("non-specific immunization").[8] Hence, in administering specific vaccines we accomplish the double task of stimulating the production of antibodies and of raising the standard of non-specific resistance of the body. The last action is accomplished by the non-specific proteins of the vaccines. The coöperation of these two factors is of therapeutic importance, as demonstrated in the following considerations.

As is known, the acquirement of immunity through vaccination, or infection, requires a period of incubation. Time must be granted to the organism and a sufficient number of doses administered until the point of saturation with antibodies has been reached. The non-specific elements, be they the foreign proteins or the vaccines, have no period of incubation. They act, but with the exception of a short negative phase, almost instantly. Thus one is justified in regarding them as an emergency action during the time when the specific factor is still inefficient. However, while specific immunity, once acquired, is a more or less lasting condition (active or latent), the peak of non-specific resistance following the administration of a foreign protein is reached within a short period after the injection and declines within two to three days.[9] Evidently non-specific treatment cannot replace the antigenic factor which is present in the vaccines,[10] and which in turn must be supplemented by the non-specific agencies.

THEORIES ON PROTEIN THERAPY.

The explanation of the fundamentals of protein therapy encounters much difficulty, and numerous theories have been advanced in an endeavor to solve the problem. The following deserve special attention:

The term "protein" therapy, suggested by Schmidt, has been attacked by some of the recent writers. Rolly[11] speaks of a "therapy by irritation" and includes in its scope the following non-proteinous substances: collargol, elektrargol, gold, turpentine,[12] iodine, and the like. In addition, gelatin, argoflavin, arsenic, phosphate, hypertonic saline solutions and distilled water have been credited with therapeutic faculties similar to the foreign proteins. *X*-ray is another instance of said therapy. According to Holthusen,[13] even small doses of Roentgen rays cause massive destruction of the lymphocytes, and the split bodies thus originated account for some of the effects of *x*-ray therapy.

Weichardt and Schnittelhelm,[14] who have been among the first to attack the problem experimentally, have called attention to the fact that almost every function of the body is being stimulated to hyperactivity. Any body tissue gives rise to activating split measure which facilitates disruption of products which stimulate the defensive forces of the body.[15] All the organs par-

ticipate in the process of stimulation and every single cell is influenced into hyperactivity and increased metabolism—a process defined by Weichardt as "protoplasma activation."[16] This theory is omnicellular and ergotrop.

Bier[17] opposes Weichardt's activation theory. His own views are based on the principles of the so-called "irritation theory" laid down by Virchow and Arndt-Schulz.[18] The diseased focus of the body is in a stage of inflammatory hypersensitiveness and reacts readily on such irritating doses, which may be too small to be of any influence on healthy tissue. Diseased tissue exposed to protein irritation responds with enforced disruption of cells. Splitting of complex protein molecules causes hyperemia and inflammation, which accelerate the process of resorption and restitution. This, in the opinion of Bier, justifies the inclusion of protein therapy into his scheme of "healing inflammation" (Heilentzündung), which has been employed with success in surgery.

While Bier lays more stress on the biological factor, the theory of Sachs[19] emphasizes the physical and biochemical changes in the blood as the responsible factor in protein therapy. Changes in the blood colloids disturb the "physical milieu" of the cells and disarrange the preëxisting condition of equilibrium between cell and serum. This is followed by stimulation of the cells, providing the dose does not exceed the tolerable quantity.

The following opinions represent the newest effort in formulating the principles of protein therapy

Freund and Gottlieb[20, 21] have emphasized the remarkable influence of the derivatives of the broken-down blood platelets on the organs supplied by the autonomous nervous system. These substances, at first vasodilatoric in character, assume a vasoconstrictoric function which accounts for their antiphlogistic action.

According to Dresel,[22] the non-specific action of the proteins is due chiefly to the derivatives of broken-down platelets. Their efficacy is increased by additional split products of the cells.

Summing up the various theories, we may well say that none of them has gained universal acceptance. This is probably due to the fact that each theory is a more or less successful generalization of some of the group reactions rather than a summary of the general principles covering all the phases of protein therapy.

PROTEIN PREPARATIONS AND THEIR THERAPEUTIC EFFECT ON THE VARIOUS PATHOLOGICAL CONDITIONS.

Parenteral protein administration can be traced back to the beginning of blood transfusions introduced into medical science about three hundred years ago.[23] To this category belongs also the autoserotherapy advocated by Gilbert. However, the procedure of protein administration has been much simplified since Schmidt and Saxl introduced milk injections for treatment of blood affections in 1916. Since then a variety of purified and refined milk preparations has been brought on the market and employed in various pathological conditions. In the following a brief account is given of these preparations and of the affections for which they have been recommended:[24]

Ophtalmosan (or abijon) is the name of a preparation containing sterile milk in ampoules ready for injections. It has been used chiefly in ophthalmic diseases (trachoma, blennorrhea). Favorable results have been reported likewise in otitis media, cholera, dysentery, chronic arthritis, purpura hæmorrhagica, pemphigus, Duhring's disease, and bubo.

In the two preparations caseosan and aolan, the proteins of the milk have been freed of other ingredients.

Caseosan, consisting of a 5-per-cent solution of pure casein, has been recommended by Linding for intravenous and intramuscular administration. It proved of value in parametritis, and in climacteric and

menstrual disturbances; in the various anemias and hemorrhagic diathesis;[25] in acute and chronic eczema, acne vulgaris, sycosis parasitaria, bubo and abscesses of the sweat glands, in gonorrhea and its complications, and the like. Recently caseosan has been used in combination with yatren (the latter contains 30 per cent iodine) in arthritis, gonorrhea, and furunculosis.[26]

Aolan has been introduced by Müller as a purified casein preparation in a toxin- and fat-free solution, and has been used for intravenous, intramuscular and intracutaneous injections for diagnostic and therapeutic purposes. Good results have been claimed in trichophytosis, furunculosis, acne, pyoderma, eczema, bubo, epididymitis, chronic arthritic processes, and like affections.[27]

Another preparation favored by some writers is xifamilk, a combination of milk protein with the proteins of saprophytic origin.

In addition, proteinous milk derivatives have been recommended for treatment of ulcus ventriculi and duodenal ulcer (Pribram and Holzer); in tuberculosis, especially of the glands and of the joints; in erysipelas and in malignancy.[28]

THE PROBLEM OF PROPER DOSAGE IN PROTEIN THERAPY.

This is a question of such paramount importance that some authors regard the efficiency of protein therapy as dependent almost entirely not so much on the kind of preparation which one favors as on the dose. In general the proper dose may be defined as the minimum, sufficient to cause proper reaction and stimulation of the body. Zimmer[29] speaks of an "irritation threshold" (Schwellenreiz). From this point (of optimum), there is the possibility of too little or too much. In the first event, no reaction will result whatsoever; in the second, considerable damage may be done to the patient. The problem is still more complicated from lack of any laboratory standard, as is the case in vaccines. The dose as well as the reaction following its administration seems to depend on constitutional factors, which in our present days are almost entirely out of scientific control. Thus the only way of determining the proper dose is by clinical observation of each individual case. However, there are a few landmarks to facilitate orientation. The stage of inflammation has to be taken into account. A dose which will not cause any reaction in normal may be too strong for patients with acute affections or focal disturbances. In general, one can follow the old therapeutic maxim that the more chronic the case, the higher the dose. However, peculiar specific and focal reactions are to be reckoned with.

Besides the quantity, there is another factor which deserves consideration: it is the frequency and intervals of application. Weichardt, and more recently Koeniger,[30] have called attention to the fact that the sensitiveness of the organism toward different therapeutic agencies is a changeable factor. A second injection following the first within the next two days is given at a time when stimulation is on the verge. This stage, the stage of increased non-specific resistance, is continued with every one of the following injections, when administered at short intervals of about two to three days apart. This is the so-called "continuous" method of non-specific treatment. It is indicated in acute conditions, where the maintenance of a higher level resistance is essential.

A different situation is presented in cases in which the next injections are followed at longer intervals, of from four to seven days. At the time when the reaction is swinging back to normal the introduction of a new dose of foreign proteins acts as a new shock which stimulates the organs to a new effort, and to multiplication of the defensive forces. This "intermittent" method is indeed, not unlike Bier's "hyperemias," of great value in chronic cases in which focal reactions, associated with hyperemia, leucocytosis, edema, and the

like, facilitate final resorption of the lesions. Though not worked out into details, as yet, this important therapeutic scheme promises to clear the path for a more rational procedure in the future. For the present the doses of the milk preparations in use, adopted empirically, are as follows: 0.1 to 0.5 cc for intravenous injections; 0.3 to 0.5 cc for intracutaneous; and 5 to 10 cc for intramuscular administration at a time. The frequency of administration varies between one, two, three and four times a week.

REACTIONS OF THE BODY FOLLOWING PARENTERAL PROTEIN ADMINISTRATION.

The reactions which have been observed in the course of protein therapy may be subdivided into two groups: general and local reactions.

Systemic Reactions.

1. Fever has been observed a few hours after the injection has been administered. As a rule it reaches its climax about six to eight hours after the injection and rarely lasts for more than twenty-four hours. However, fever is by no means a universal symptom, as there are many cases, forming the majority of our observations, which do not exhibit any rise in temperature, and others whose symptoms are but very insignificant. At any rate there seems to be no proportion between the changes in the temperature curve and therapeutic expediency. As a rule no fever has been observed in cancer and diabetes, while pernicious anemia usually develops high temperature.[31]

2. Increased metabolism is another factor coincident with that treatment. Some patients complain of loss of weight, which is usually followed by a sharp gain. Underweight babies, in which other therapeutic measures have failed, do often regain their vitality on parenteral serum injections.[4]

3. Euphoria is one of the most striking symptoms of successful protein treatment. It succeeds a phase of nausea, discomfort, somnolence, and fatigue, lasting for a few hours after injection.[32]

4. Notable changes have been reported in the blood serum. As a rule the viscosity of the blood is increased, and so is its ability to coagulate. Large quantities of thrombokinase and fibrinogen appear in the blood. Its protein compounds are increased (hyperproteinemia). According to Berger[33] a short negative phase of hypoproteinemia is followed by an increase in the fibroglobulins, which in turn is succeeded by an increase in the seroglobulins and serumalbumins of the blood. Gabe[34] found in cases treated with small doses, a marked rise in the lipoids of the blood. Isaacs reports changes in the blood-sugar level.[35] The antibodies titer is raised and the appearance of large quantities of agglutinins has been observed.[14]

5. No less interesting are the changes of the organized blood elements. The red blood count has been reported increased. The appearance of nucleated red cells has been observed. The blood platelets which appear in large quantities undergo disruption, and their split products are said to increase the coagulability of the blood. These substances (histamin-like in character) are also of special influence on the blood-vessels and other organs supplied by the autonomous nervous system.

The white cells, considered as the chief source of various antibodies, have naturally aroused much interest with regard to their function in protein therapy. However, the results obtained by various investigators are by no means uniform. As a rule, protein injections are followed by initial leukopenia lasting for a short period and giving way to a marked leucocytosis. According to Kaznelson,[36] the numerical increase in the white cells is usually confined to the neutrophiles. The neutrophile leucocytosis is successively replaced by a lymphocytosis which appears after a longer or shorter period of time. Some authors regard the appearance of the lymphocytosis as a sign of recovery, and Rolly[11] regards low lymphocytosis as a contraindication to pro-

tein therapy. Besides the numerical problem, the leucocytes, next to the platelets, undergo disruption easily, delivering various protein derivatives and split-bodies, which are a source of stimulation.

6. Changes in the hematopoietic system: The modified blood picture as a result of non-specific irritation suggests the existence of special reactions in the hematopoietic system. This assumption has been confirmed in autopsy of the bone-marrow, which gives evidence of hyperemia and hyperactivity of the cells. The same can be said of the lymph glands. One can observe enlargement of the germinating centrum and lively karyokinesis of the nuclei.[37]

Focal Reactions.

The local reactions which appear in the course of protein therapy are the most important from the practical as well as the theoretical point of view.

As pointed out already, diseased tissue remains in a stage of inflammatory hypersensitiveness, which denotes a special inclination of the tissues to respond with inflammation to a stimulus otherwise insufficient to derange normal tissue. Focal reaction means exacerbation of a chronic process, in which some sort of armistice had developed between the defensive forces of the body and the pathological invaders; as if some kind of mutual tolerance had been established, with little effort from either side to disturb the *status quo*.[6] The introduction of a foreign protein under these conditions acts like a sudden shock; it disturbs the latency of the process and upsets the unbalanced equilibrium. The chronic condition turns acute and is followed by a revival of allergic reactions and aggravation of symptoms. This is the general pathology of what we call "focal reaction."

The reaction is essentially diphasic. The first stage has been called the "negative phase." On examination of the diseased area, erythema, swelling, tenderness and the like are marked symptoms suggesting that aggravation of the inflammatory process has taken place. In selected cases this is sooner or later followed by resorption and subsidence of the inflammatory process (the "positive phase").

However, focal reactions are not always followed by positive therapeutic results, and there are numerous conditions in which the negative phase remains a predominant feature. Tuberculosis is such a disease. A visceral focus of tuberculosis which has been latent for many years may become as florid under protein treatment as it may under tuberculin administration. The major difference between the specific and the non-specific agent lies in the dose. Whereas 0.1-0.5 mgm. of tuberculin is sufficient to cause a focal reaction, the dose required to produce such reaction with milk injections is 10 to 100 times larger.

Other affections in which for similar reasons protein treatment may be contra-indicated are: latent malaria, bronchial asthma, cholelithiasis, epilepsy, valvular affections of the heart, affections of the kidneys, etc. These are the danger points of protein therapy.

SPECIFIC AND NON-SPECIFIC SKIN REACTIONS.

The therapeutic value of skin reactions had been appreciated long before the medical profession was familiar with the fundamental biological processes underlying these reactions. The practical mind has outdistanced theoretical knowledge; and heliotherapy, baths, blisters, rubefacients and similar methods of so-called "counter-irritation" have been applied for generations with the object in view of gaining favorable influence upon deep-seated pathological processes.

The influence of skin reactions on remote pathological conditions is most outspoken in infectious diseases. It has been emphasized recently that the various eruptions due to toxemia indicate not only the existence of allergic reactions in the body and their comparative strength, but also that the skin participates directly in the production of antibodies.[39] This is seen in variola, for instance, where the eruption is followed by a drop in temperature. An-

other example of direct influence of skin affections is the so-called "érysipèle salutaire," which may even cause the disappearance of sarcomatous growths. Classical instances of direct or indirect influence of the skin on the course of the disease have been noted in syphilis and tuberculosis, of which a few examples may be cited.

It is a known fact that neurosyphilis favors patients who give a history of insignificant secondaries, while, as a rule, the more severe skin reactions in secondary syphilis (syphilis ulcerosa, for instance) speak against the possible development of metasyphilitic affections. To this may be added the very interesting observations reported by Buschke and Freymann to the effect that patients who acquired a salvarsan or mercury dermatitis have been benefited in their syphilitic symptoms.

Similar experience has been met with in tuberculosis. A patient with lupus, with eruptions of the tuberculid type, offers a more favorable prognosis than the visceral tuberculosis. Thus says Moro:[40] "In each case of infantile tuberculosis, in which there has developed a lichen, a scrofuloderma, or a spina ventosa, one is justified in regarding them as a sure indication that the primary lung lesions are curable." Not unlike syphilis, a vigorous tubercular skin reaction seems of direct benefit in the course of tuberculosis.

Guided by similar considerations, Ponndorf and Moro conceived the idea of influencing the course of tuberculosis through provocation of proper skin reactions. For this purpose Ponndorf recommended intracutaneous tuberculin inoculations, while Moro advocated local applications to the skin of a modified tuberculin ointment of Petruschky. The latter application causes specific irritation of the skin and is followed by reactions not unlike the tuberculids in character (artificial acnitis or lichen scrofulosorum). Suggestive in this respect are the reports of Fellner, who found the cells of the tuberculids saturated with antitoxic properties or antibodies, and who therefore favors the conclusion that the tuberculids are a form of autoimmunization.

Summing up the above observations one is justified in assuming that the skin, irrespective of its function as an external protective organ (exophylasis), has acquired remarkable biological capacities for which Hoffmann applied the name "esophylaxis."[41] The tendency of the esophylactic function of the skin consists in destroying and eliminating the pathogenic parasites and their toxins in order to protect the vital organs from bacterial invasion. As Hoffmann expresses himself: "The skin is the grave of the parasites." It plays a leading rôle in allergic immunity and sensitization (Petersen). Most of these reactions are essentially specific, though readily influenced by non-specific factors.

The non-specific reactivity of the skin has been studied by Luithlen.[42, 43] Luithlen called attention to the fact that following an injection of blood plasma, gelatin, Witte pepton, or colloidal silicate and starch, the sensibility of the skin to inflammatory agencies is depressed. This is due to alterations in the permeability of the peripheral capillaries in consequence of colloidal injections. The antiphlogistic condition of the capillaries (their contraction) accounts partially for the good results obtained with protein therapy in skin diseases. However, the problem of skin reactivity is much more complicated, and other factors, unknown as yet, play probably a decisive rôle. The following reports dealing with intracutaneous injections are suggestive in that regard:

Müller[44] reported the presence of a marked leucocytosis which appeared in the blood-vessels of the subcutis in the vicinity of the injection and lasted for over twenty-four hours. Phagocytosis was absent. As a rule, leucocytosis did not appear in subcutaneous administrations despite the dose being 50 to 100 times larger than the small quantity given intradermally. Another important observation reported by the same author demonstrates the remarkable capacities of small aolan doses in influencing remote pathological conditions. This has been observed in gonorrhea, where intracutaneous injections

of 0.2 cc aolan proved quite a strong provocative. Nevermann[45] confirmed the provocative character of the intradermal injections, and in addition called attention to a peculiar local reaction of the skin at the point where the injections were administered. It consisted of erythema, edema, and deeper infiltrations of the tissues. The reactions were strictly confined to gonorrhea and its complications.

NON-SPECIFIC PROTEIN THERAPY IN SYPHILIS.

Protein injections are not without value in syphilis.

Uddgren, while treating keratitis parenchymatosa with milk injections, was confronted with a sudden positive change of the Wassermann reaction in some of his cases. Guszman,[46] who made a special study on the subject, was able to confirm the Wassermann provocative effect of the protein injections in a relatively high percentage of luetics. Some cases of old syphilis responded to a single or a few injections, with a sudden turn of the Wassermann test into a strongly positive phase. In addition he was impressed by the fact that some of the old syphilitics with a persistent positive Wassermann, who remained so in spite of numerous antisyphilitic courses, yielded to a few additional milk injections, and remained negative for the time of observation.

The therapeutic value of protein therapy in syphilis was emphasized by Kyrle[47] in 1917. Impressed by the fact that syphilitic lesions disappear spontaneously during an attack of erysipelas, for instance, he inaugurated a course of protein treatment in syphilitics. His object was to provoke fever, which he considered as an antisyphilitic factor. In most of the instances these injections were followed by involution of the visible syphilitic lesions, in contradistinction to the Wassermann test, which remained for the most part uninfluenced. This induced the investigator to combine protein therapy with usual antisyphilitic therapy, a few mercury injections for instance, which resulted in complete disappearance of all syphilitic symptoms and a persistent negative Wassermann. Schreiner[48] reported similar results with injections of peptone solutions. Recently Finger's clinical staff has been using mirion (an organic iodine preparation), which in combination with neosalvarsan has been reported of assistance in syphilis.

The main indication of protein therapy in syphilitics is in neurosyphilis.

The first to use a non-specific in tabes and paresis was Jauregg V. Wagner in 1909, who presented a series of paralysis cases apparently benefited by a combined course of tuberculin and mercury injections. Somewhat later he claimed similar results with a staphylococcic vaccine, and in 1917 the same author, guided by the experience that fever has a beneficial effect on paralysis, recommended malaria infection as the best method for treatment of paralysis.[49]

Although these seem the most effective, there are other methods of non-specific agencies recommended in tabes and paresis. Döllken observed improvement of tabetic symptoms with injections of tuberculin or pyocyaneus vaccine. Donath and Fischer[50] advocated injections of 10-per-cent solutions of sodium nucleinicum. Quite recently, Fischer[51] introduced a new protein split substance called "phlogetan," for treatment of tabes and paralysis.

PERSONAL EXPERIENCE.

Our experience with protein therapy is based on observations made in over one hundred cases treated with aolan exclusively. It includes the following dermatological affections: acne vulgaris, furunculosis, pyoderma, abscesses of the sweat glands, folliculitis barbæ, tinea, kerion celsi, intertriginous and vesicular eczema, psoriasis, lichen planus, Duhring's disease, pemphigus, ulcers of the leg, urticaria, and generalized pruritus.

As for technical details connected with

the treatment, we have resorted to intramuscular as well as to intracutaneous injections (the latter in about one-third of our cases). Intramuscular injections were given into the buttocks, in doses of 5 to 10 cc in adults, and 3 to 5 cc in children, at intervals of about two to four days. The intradermal method was applied at the extensor surface of the arm. Two injections, two inches apart, were given at a time. For each injection 0.2 cc aolan was used. At the points of intracutaneous inoculation, two wheals appeared of about one-half-inch radius each. They subsided gradually in from ten to twenty minutes. The intradermal and intramuscular methods proved free from danger, and there was not the slightest intimation of an anaphylactic shock, such as has been described by Gildemeister and Seifert as following intravenous medication. Subjectively, intramuscular injections are practically painless, while intradermal administration may be accompanied by slight pain. In addition, the latter may be followed by the development of a local reaction such as erythema and edema of the tissues in the vicinity of the wheals, which usually subsides in from twenty-four to forty-eight hours. No such local reaction occurred in cases treated intramuscularly.

The general reactions following aolan injections were in accordance with the observations described above, and little difference could be noticed between the two methods used in our cases. Fever was not a frequent concomitant, and where it developed, it usually subsided during the first twenty-four hours. The majority of our cases complained of a feeling of slight discomfort and depression, which was succeeded by euphoria within six to twelve hours.

In particular, the following therapeutic results have been obtained: The largest experience we have had refers to acne vulgaris, of which thirty-five cases are on record. Though local treatment was discarded, most of the cases showed decided improvement, consisting in involution of the lesions (papules, tubercles, pustules, and small abscesses). This did not prevent recurrence of some of the lesions after the injections had been discontinued. As a rule, little difference has been noticed between the two methods as far as their efficacy is concerned.

Another group of cases in which aolan was used with much benefit were the pyodermas of the skin, folliculitis, and furunculosis. Two to three injections of 10 cc aolan were mostly sufficient to check the disease, while other cases required continuation of the treatment for a longer period. Similar experience has been had in suppuration of the sweat glands, where protein therapy seems to be the method of choice in reducing the inflammation.

A case of folliculitis barbæ of the superficial, erythematous type, of two years' duration, was much benefited with aolan, of which ten injections of 10 cc each were given intramuscularly about twice a week. Two more cases of the deep infiltrating and pustular type of sycosis remained uninfluenced despite prolonged aolan treatment.

Practically no results could be noticed in impetigo contagiosa and superficial tinea capitis, while two cases of kerion celsi have been improved with aolan injections combined with local medication.

Psoriasis, which has been reported amenable to intradermal protein therapy, proved rebellious despite numerous intracutaneous inoculations in a series of cases. Similar observations could be made in lichen planus.

A case of pemphigus was treated with no definite results, while a case of Duhring's disease apparently improved under that treatment. The latter, a female of thirty-eight years when first seen, presented pigmentations and atrophies after involuted lesions and a fresh eruption of large bullæ and pustules. They were most abundant at the sites of predilection of that affection, with multiple papillomatous vegetations upon some of the ulcerating lesions,

suggesting vegetating dermatitis.[52] Under aolan the lesions dried up and the skin became free from vegetations; and though there was no suggestion of a complete cure, improvement certainly was to be noticed.

Good results have been obtained in some of the ulcers of the leg. Patients with inveterate ulcerations, complaining of severe pain and suffering from itching, reported a marked relief after the first injection and progressing improvement with each subsequent administration. Objectively in response to non-specific stimulation, a clearing of the base of some of the ulcers was noticeable and a springing up of new granulation tissue indicated the beginning of recovery. However, this was not the case in all ulcers.

Similar results can be reported in some of the chronic urticarias and pruritus. As a matter of fact, some of the patients who have been annoyed for years with that disease and therefore subjected to a variety of therapeutic procedures without lasting benefit, showed improvement after the first few injections as far as their subjective symptoms were concerned.

SUMMARY.

1. The non-specific proteins of the vaccines stimulate the non-specific resistance of the body. They cannot replace the specific (antigenic) factor in immunization.

2. The following theories have been advanced on protein therapy: Protoplasma activation by Weichardt; healing inflammation by Bier; and colloidal disturbances by Luithlen and Sachs.

3. Injections of milk and its proteins (ophtalmosan, caseosan, aolan, and xifamilk) have been reported of value in a variety of pathological conditions.

4. The question of proper dosage has been discussed and in particular two methods of administration recommended: the continuous for acute and the intermittent for chronic conditions.

5. The general and focal reactions have been analyzed and their therapeutic value as well as the danger points indicated.

6. The skin, irrespective of its function as an external protective organ (exophylaxis), possesses biological capacities assisting in destruction and elimination of the parasites and their toxins (esophylaxis) before invasion of the vital organs takes place.

7. Intracutaneous injections of small doses of a foreign protein are followed by alterations in the allergy of the skin and by focal reactions in remote lesions. The injections proved a provocative in gonorrhea.

8. Foreign proteins have been used as a Wassermann provocative and in combination with mercury or neosalvarsan as an antiluetic therapeutic measure.

9. In tabes and paresis, protein therapy is the method of choice.

10. In our experience, aolan proved of service in acne, pyoderma, furunculosis, folliculitis barbæ, Duhring's disease, ulcer of the leg, urticaria, and pruritus.

Protein therapy is not a panacea. In selected cases its remarkable stimulating effect is undeniable. In cases in which the defensive forces of the body are weakened beyond the possibility of stimulation, protein treatment is practically useless.

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Arsenic in Cocoa.

In an editorial in the *British Medical Journal* of December 30, 1922, on this subject, it is stated that the occurrence of arsenic in cocoa must rank among the most unexpected events. A summons was heard at Richmond on December 18 against the Home and Colonial Stores for selling cocoa containing one-fortieth of a grain of arsenious oxide per pound. Messrs. Rowntree & Company, Ltd., of York, were also summoned for aiding and abetting in the alleged offense. Both defendants formally pleaded guilty. Evidence was given which showed that the seller had blended seven different cocoas, one of which, supplied by Messrs. Rowntree, was found to contain arsenic to the amount of one-tenth of a grain per pound. The arsenic was traced to a quantity of potassium carbonate, used by the manufacturers to render the cocoa soluble. Nothing was stated as to the source of the potassium carbonate or the origin of the arsenic it contained.

Formerly arsenic as an impurity of potassium carbonate was so unlikely as to receive no consideration. Such proportions as a hundredth of a grain per pound might have been found, but that proportion is a commonplace in manufactured chemicals. The British Pharmacopœia permits two parts of arsenic per million, or one-seventieth of a grain per pound, in potassium carbonate. Shortly before the war there came on the market for the first time a sort of potassium carbonate which contained arsenic in a proportion of about one grain per pound. No one seemed to know where this stuff came from, but there is little doubt that it was of German manufacture, and had been produced by some unusual process. On the outbreak of war a scarcity of potash salts arose, and this particular supply disappeared. Now apparently it has come back on the market more vitiated than ever. What must have been the proportion of arsenic in a sample of potassium carbonate which, being added to cocoa in quite small amount, produced a mixture containing one-tenth of a grain of arsenic per pound?

The statement made to the court on behalf of Messrs. Rowntree showed that the firm had taken precautions to insure the purity of the materials they used in the manufacture of cocoa. In July they were informed that some of the loose cocoa they supplied contained traces of arsenic. The chemists employed by Messrs. Rowntree immediately instituted a searching analytical examination, and it was ascertained that the potassium carbonate used for the purpose already mentioned contained a substantial quantity of arsenic. Inquiries were addressed to the manufacturers of this lot of potash, but no explanation had been obtained. Messrs. Rowntree sacrificed the whole of the cocoa—some 300 tons, varying in value from 100 to 250 pounds sterling. The period during which the impure cocoa was sent out was about two months, and since August 1 the firm was confident that all the cocoa issued from its works was made from ingredients absolutely free from arsenic.

A witness for the Home and Colonial Stores stated that that company, as soon as it heard of the discovery, had withdrawn 65 tons from its shops and 20 tons from its warehouses. How it came about that arsenic was present in the common potassium carbonate supplied to Messrs. Rowntree has therefore not been satisfactorily established, but it is certainly to be hoped that it will be ascertained, in the interest of food manufacturers as well as for the safety of the public. It is impossible to examine everything for arsenic regardless of whether it is a likely or unlikely impurity, but it seems evident that more extensive analytical scrutiny will be needed in future.

Editorial

THE QUESTION OF TWILIGHT SLEEP.

At various times in the past we have discussed in the editorial pages this subject, which is of so much interest to the practitioner and the pregnant woman. We think that our readers have come to the conclusion, with ourselves, that twilight sleep has a very distinct application in obstetrics, but that it is absolutely essential that if this condition is to be produced, the patient should be in an institution where she can have watchful care and where she can be so isolated that she will not be disturbed in the early stages of twilight sleep by the noises of the ordinary household. To put it differently, twilight sleep is not a method which can be resorted to by the busy practitioner who goes from one case to another, returning to determine how far labor has advanced. The patient must be watched from the first hypodermic injection on to determine as to the repetition of the doses and the size of the doses which follow the first.

There has been a wide divergence of opinion amongst obstetricians as to the utility of this method, it being claimed by some that the child is more prone to asphyxia and by others that the statistics fail to prove this assertion.

While each practitioner must reach his own conclusion from personal experience, nevertheless he must be keenly interested in any report which embodies a very large experience covering hundreds, or thousands, of cases, and such a report is to be found in a recent issue of the *Journal of the Missouri State Medical Society* by Krebs and Wilson from the Department of Obstetrics of the Washington University School of Medicine, who not only report upon their own experience, but call attention to a recent paper by Opitz published in Munich, who states that amongst 4279 births, 2242 of which were effected in twilight sleep, only 2.1 per cent of the children born in twilight sleep died during the first nine days, while the mortality among children delivered without the use of twilight sleep reached 3.75 per cent. Opitz is of the opinion that the danger depends upon the amount of morphine used, and that a most essential factor is perfect command of the technique, which requires careful study. This seems to be the universal opinion of those who have followed this method.

Krebs and Wilson report a little over 1100 cases of obstetrics, and further that a large majority of the primiparæ received scopolamine-morphine or hyoscine-morphine semi-narcosis during their labors. When the patient was ready for delivery, however, she was brought to the edge of the delivery bed, scrubbed up, and a general anesthetic administered. When the head had descended to the floor of the pelvis and had completely rotated with the sagittal suture lying in the anteroposterior diameter with the small fontanel lying directly beneath the symphysis pubis—that is to say, when a considerable segment of the head is visible and has distended the vulvar ring to approximately its elastic limit—the forceps was applied and the head delivered.

They further state that before delivering the head, the vagina and the levator muscles are, as they express it, ironed out by introducing first the well lubricated finger, and then two, three or four fingers, followed by the whole hand, into the vagina, stating if this is not sufficient to permit of delivery of the head without tearing, an episiotomy is done, either the single or double medio-lateral or the median type, depending upon the requirements of the case.

It is noteworthy that this plan can scarcely be considered the complete employment of scropolamine-morphine twilight sleep, for they frankly admit that very few of the patients receive no anesthetic whatever, practically all of them getting chloroform or ether during delivery, chloroform being most generally employed, and ether being reserved for toxemic cases, or whenever

chloroform for some special reason seemed contraindicated. Following the birth they also administer a full cubic centimeter of pituitrin, injected intramuscularly, to guard against hemorrhage in the third stage.

To sum the matter up, therefore, they use the twilight sleep procedure as a first-stage measure and do not rely upon it for the entire labor, but they carry out the technique of twilight sleep by having the patient's ears stuffed with cotton moistened with oil and the eyes covered with gauze held in place by adhesive strips.

The initial dose of scopolamine is 1/130 of a grain, as is also that of hyoscine.

Incidentally our readers will remember that this is a clinical distinction between hyoscine and scopolamine not recognized by the authorities of the United States Pharmacopœia, or, to use the words of the National Standard Dispensatory, scopolamine is identical wth hyoscine.

With the mydriatic alkaloid they give 1/6 of a grain of morphine sulphate hypodermically. This first injection usually causes some dryness of the mouth and flushing of the face, which is to be relieved by having the patient drink water freely. Forty-five minutes later the second injection of scopolamine is given, but the morphine is never repeated. Before each injection the patient is requested to put the index-finger to the tip of her nose, her eyes being covered. If she does this promptly, she still retains what Krebs and Wilson call locomotor coördination, and this indicates another dose. If, however, she moves her finger around vaguely, the injection is omitted or the dose reduced. In most cases they state that this condition is reached soon after the third injection. The third injection usually follows, forty-five minutes after the second one, but the dose is reduced to 1/200 of a grain for the average case, unless the patient seems resistant to the drug, in which case 1/130 of a grain is used. Following the third injection the patient is usually sufficiently stupefied to have the effect of the drug continued for two hours or longer, and in most instances at the expiration of this period the cervix will be found fully dilated; for this reason further injections are unnecessary and are to be avoided.

When the first stage is over or nearly so, the semi-narcosis they believe should be deepened to deep anesthesia by one of the general anesthetics. In a primipara, or one in whom the first stage of labor is greatly delayed, and especially in primiparæ in whom the membranes have ruptured before the onset of labor, they believe that scopolamine and morphine has a most valuable field, since it bridges over a period before the onset of labor and the time the general anesthetic is to be administered for actual delivery; but they emphasize the fact that the administration of these drugs must be watched most carefully, and once the locomotor coördination, to which we have referred, has been reached, this should be maintained by small and infrequent doses. As another method of controlling the degree of drug action, they watch the pupils during uterine contraction to determine the full effect of the medicine.

Krebs and Wilson also emphasize the fact that when a general anesthetic is employed, great care must be exercised not to give it too freely—10 to 15 drops of chloroform on a thin gauze mask usually being sufficient to completely relax the patient.

Another type of case in which they think that twilight sleep is valuable is in those instances where because of operative procedure following previous deliveries parturition is delayed, or where abdominal Cæsarean section has been performed, since by inducing twilight sleep in the first stage, straining on the part of the woman, which puts stress upon the uterine scar, is avoided. So, too, they recommend it in cases of cardiac disease and pulmonary tuberculosis.

In connection with the length of labor under their procedure, they state that the average was one hour and thirty-seven minutes longer than when no semi-narcosis was used, but they do not think that this is an argument against its employment, because in some of their statistics the drugs were not employed early enough to really meet the first stage. In connection with the

second stage of labor, they found that the difference between the duration in semi-narcosis and without it was only eleven minutes against the scopolamine method.

After the woman has been delivered and returned to bed, quiet is insisted upon, and she usually enjoys a sound sleep for several hours.

Concerning the important question as to how much pain is relieved by this plan, they believe that a very large proportion can be considered, to use their words, "perfect for pain." To quote their statistics exactly, we find that in 86.3 per cent there was perfect semi-narcosis, in 3.8 per cent pain was prevented, in 4.8 per cent the method was considered partially successful, and in 4.8 per cent it was said to be unsuccessful.

So far as the influence of this method upon fatigue is concerned, they state that in 158 cases in which the question of fatigue was recorded, it was found lacking in 144, or 91.1 per cent.

Finally it is interesting to note that of the more than 1000 mothers treated the total death-rate was 0.7 per cent, and two of these seven cases died of causes in no way related to pregnancy. They believe that these statistics are somewhat better than those shown by the methods carried out when these narcotics are not used. Their fetal mortality in infants weighing over 2500 grammes was 2.16 per cent, compared to Williams's figures (3.71 per cent) in a series of the first 10,000 cases in the obstetrical practice of the Johns Hopkins Hospital. They therefore believe that the claim that twilight sleep is dangerous to the child is without foundation.

THE INTRACARDIAC INJECTION OF ADRENALIN.

Some weeks ago there appeared in the daily papers, as if the subject had never been discussed before, a statement concerning the intracardiac injection of adrenalin to combat heart failure arising as a complication of surgical procedures or in the course of illness. Medical men who have kept abreast of medical literature during the last year or two recognized, of course, that this report was not as novel as the newspapers appeared to think, attention having been called to this employment of adrenalin long before the date to which we have referred.

It is an interesting coincidence that in the issue of the London *Lancet* of March 24, Carl Bodon of Budapest contributes an exhaustive paper upon this topic, including seventeen references to its bibliography, but with the characteristic Teutonic method these seventeen references are all of them of German or Austrian origin, and none of the French references dealing with this subject are referred to by him.

There is not space in this editorial note to describe all the points taken up by Bodon. A brief description can be given, however, of one remarkable case. A man of fifty-six, who had been when waking in the morning experiencing a sense of dyspnea for several days, was found sitting in an easy chair struggling for breath, covered with a cold sweat, cyanotic, and, evidently from his physical signs, suffering from dilated heart with all the manifestations of acute pulmonary edema. Full doses of morphine, caffeine and adrenalin given intramuscularly produced no improvement. The peripheral circulation practically ceased, the man became pulseless and was apparently dead, the eyes being widely open and the pupils dilated with absence of corneal reflex; shallow inspiration at long and irregular intervals carried the air only as far as the larynx or bronchi. No pulse could be felt in the radial or coronary arteries. Auscultation of the heart revealed an embryocardia. At this point the respirations ceased completely and the patient passed feces and urine involuntarily. Bodon, therefore, considered that he was probably dead and that no harm could follow an intracardiac injection. The man had an enormous chest with thick walls, but nevertheless Bodon thrust his needle through the fourth left intercostal space exactly at the sternal border and easily entered the heart. He could feel a slight short contraction caused by the irritation of the needle in the heart

muscle, and he immediately injected 1 cc of a 1:1000 adrenalin solution and withdrew the needle. Within a few seconds a steady improvement of the heart-beat took place, the radial pulse became palpable, respirations set in, the corneal reflex returned, the pupils contracted, and the pallor of the lips disappeared, as did the cyanosis. The patient did not recover consciousness for two hours, and on awakening remembered nothing of what had happened. Two and a half hours after the injection he could walk with assistance a few steps to his bed. Three months later the patient felt perfectly well.

After detailing this case, Bodon goes on to quote the German literature to which we have referred, stating that he has not had access to the English, French, and Italian publications because of the war. Those who are interested in this subject will, however, as we have already intimated, find a very satisfactory summary of the experimental and clinical work which has been done by the men whom he quotes.

Bodon has been able to collect 90 cases, in which lasting results were obtained in 24, including his own case. The various substances which have been used have been camphor, caffeine, the various derivatives of digitalis leaf, strophanthin, adrenalin, pituitrin, and strychnine. The general conclusion has been that no one of these approaches adrenalin in efficiency, and that it is better, if possible, to get the injection into the left ventricle than into the right. Bodon believes that more than 1 cc of the 1:1000 solution of adrenalin is not only not necessary but inadvisable; nor does he think it advantageous to dilute this quantity with normal salt solution.

He is cautious enough to consider the danger zones in the carrying out of this operation. These are the upper two-thirds of the sulcus longitudinalis anterior, the atrio-ventricular septa, the bundle of His, the region of the coronary vessels, which is situated principally along the sulcus and which can be avoided with certainty if the injection is not made too high. Then, too, the internal mammary artery is to be avoided by puncturing close to the sternal border, because it passes at the height of the second to fifth interspace at a distance of 15 to 17 mm. from the edge of the sternum. The site of the puncture to reach the left ventricle should be in the fourth or fifth interspace, or if the heart be very much dilated, in the sixth interspace one fingerbreadth inward from the left border of relative heart dulness; that is somewhat inward from the apex beat, and the needle should be advanced cautiously inward and upward, when it can be felt engaged in the heart muscle and moving is the result. If it is desired to reach the right ventricle, the puncture should be made in the fourth intercostal space on the upper margin of the fifth rib close to the sternum.

We note with interest that such punctures never seem to result in extravasation of blood into the pericardial space. The small quantity which might escape produces no mechanical difficulty, as the writer of this editorial proved many years ago in a series of experiments.

The interesting question arises as to how soon after apparent death such injections can be expected to produce results. Admitting that they are not to be resorted to except *in extremis*, it is nevertheless believed that they may be efficient as long as five or ten minutes after death has apparently occurred. Later than this the failure of the circulation has produced such changes in the brain and cord that recovery is impossible.

As this method of treatment does not induce pain, however heroic it may seem, and as it possesses the only factor of hope under circumstances which so far as human intelligence is concerned are utterly hopeless, we think that the profession will regard with interest the contributions made to this theme up to the present time, and that we will find recorded in medical literature an increasing number of instances in which this plan of treatment has been carried out and has failed to produce results or has been brilliantly successful.

INTESTINAL ANTISEPSIS.

For many years the medical profession has been keenly interested in so-called intestinal antisepsis. Thirty or more years ago salol and other salicylates were largely used, as, indeed, they are to-day, with the idea that a desirable effect could be obtained in arresting putrefactive or fermentation processes in the stomach or bowels. Subsequent to this, the investigations of Metschnikoff, from which he asserted that the lactic acid bacillus could be used as an intestinal antiseptic in that it inhibited or prevented the growth of deleterious organisms, resulted in this method of therapy becoming extraordinarily popular, and in some instances was carried to extremes which were entirely unjustified by the investigations of Metschnikoff or his successors.

It soon became clear that whatever value these microörganisms might have in medical practice, their sole field of usefulness was in those instances in which there was putrefaction of the proteins, and that they were directly contraindicated where there was fermentation of the starches and sugars, since, as is obvious, as soon as one stops to consider the matter, their introduction in large numbers into the alimentary canal simply increases the fermentation processes already in existence.

Still more recently laboratory researches upon the stools of patients who are ingesting even the best type of the lactic acid bacillus, commonly called the Bulgarian, have seemed to prove that they do not, even under exceptionally favorable circumstances, increase in number to any material extent in the alimentary canal, and that by the time the intestinal contents reach the colon such contents are practically devoid of the bacillus which has been swallowed.

It has been found on the other hand that the bacillus acidophilus, as we have pointed out in an editorial in the April issue, seems to possess all the therapeutic value of the lactic acid bacillus and to be capable of maintaining its existence and multiplying, and, furthermore, of fulfilling the purpose indicated, namely, the correction of conditions in the presence of putrefaction.

It is not our intention, however, to dwell so much upon this general theme as to call attention to a research recently carried out by L. R. Dragstedt, C. A. Dragstedt and Nisbet upon the effect of antiseptics on a type of experimental intestinal toxemia, using dogs for the subjects of their research, which, of course, is a qualifying factor to be considered in giving weight to their conclusions as to human beings. The substances which they employed were very numerous, varying from ether, 70-per-cent alcohol, 2-per-cent lysol, 5-per-cent silver nitrate, 5-per-cent phenol, a saturated solution of salol, 10 per cent in alcohol of thymol, camphor, menthol, naphthalene, Dakin's solution, beta-napthol, quinine in saturated solution, and mercuric chloride.

Their method of experimenting did not consist in administering remedies by the mouth and then studying the condition of the stools or the condition of certain segments of the intestine, but in dividing the intestine in two places eight or twelve inches apart, then reuniting the proximal and distal intestine around the isolated segments in such a way that the blood supply was not interfered with or the mesentery injured.

The conclusions which they reached from their investigations are that the direct application of antiseptic solutions to short segments of the intestine in dogs does not prevent the production of intestinal toxins or result in sterilization of the contents of the area studied.

Clinicians will, of course, regard this research with interest, as it has some collateral bearing upon the important problems that they meet with at the bedside or in office practice, but they will also recognize that there is a wide difference

between the conditions produced in these animals and those which exist in a patient in which the so-called intestinal antiseptic may be administered.

Furthermore, we must bear in mind the distinction between an antiseptic and a germicide. By the latter, we mean something which is capable of completely destroying a microörganism. By the former term we refer to a substance which by an action on a germ prevents it multiplying, and diminishes its numbers either by direct effect upon it or by producing such changes in its surroundings that its conditions for life are unfavorable; or, to put it differently, it may be quite true that it is impossible for the physician to render the alimentary canal sterile by the administration of any drug, but this is not equivalent to the statement that by the administration of certain substances he cannot materially modify fermentative and putrefactive changes to such an extent as to give the patient a degree of benefit which would be almost equal to complete sterilization.

This is probably the explanation of the fact that the lactic acid bacillus is still employed by a large number of physicians in putrefactive conditions of the intestine with asserted benefit. In other words, they are correct in thinking that, at least in the upper alimentary canal, these microörganisms perform the function which is desired even if they are unable to survive a passage all the way through the intestinal tube.

No one to-day would deny the value of antisepsis or asepsis in surgical wounds, and yet there are few who would claim that by the methods now universally employed perfectly sterile wounds have to exist before healing will take place.

Last of all, it is not unimportant to recall that the microörganisms which inhabit the alimentary canal of man or of animals are not all evil in their effect; that many of them protect their host from pathogenic organisms, and many of them are of distinct value in carrying on the processes of digestion and nutrition.

THE TREATMENT OF SYPHILIS INVOLVING THE BRAIN AND SPINAL CORD.

Syphilitic involvement of the brain and spinal cord is usually a late manifestation of infection, and for this reason, if for no other, is the most difficult manifestation of this malady with which we have to deal. Again, when the symptoms appear the infection has lasted for so long a time that, on the one hand, advanced degenerative changes are present, and, on the other hand, it is possible that the parasites which remain have become immune to the natural protective processes of the body or have become so deeply buried in the nervous tissues that our most active antisyphilitic agent, arsphenamine, is unable to reach them.

It will be recalled that arsphenamine introduced by intraspinal injection produces so intense an inflammatory condition as to be absolutely contraindicated. It will also be recalled that Swift and Ellis proposed a plan in which they thought the arsphenamine could be given intravenously, and afterwards the blood serum of the patient, after it had been separated from the corpuscles, could be given intraspinally, the idea being that by this means minute quantities of arsenic might be brought in contact with the infecting organism and that antibodies developed in the serum by the intravenous injection might play a part in protecting the patient. It will also be recalled that this plan has been instituted by many physicians, and that the results have been enthusiastically received by some and labeled "zero" by others.

One of those who have been most urgent in asserting that such intraspinal injections are definitely of value is Fordyce, while on the other hand, as our readers will remember, from a contribution made to these pages by Dercum, he believes that the injection in itself is entirely without effect and that better results can be obtained by the intravenous use of the drug followed by spinal puncture, the good results which

accrue being due to minute quantities of arsenic gaining access to the nervous system, to the development of antibodies, and, perhaps, chiefly to the relief of intraspinal pressure whereby intraspinal circulation is modified.

Of course the almost universal opinion holds that in paresis the use of arsphenamine, and nearly related compounds, is almost useless. It seems to be generally recognized that taking it all in all the type of the case which we are discussing is in a large proportion of instances more benefited by the modern methods of using mercury than by the use of the newer drug.

Grave doubt has been thrown upon the ability of arsenic to gain access to the cerebrospinal system by investigations carried out by numerous laboratory workers. The latest of these to which we wish to call attention are Rudolf and Bulmer of Toronto, who have published in the *American Journal of the Medical Sciences* a very carefully prepared research involving the chemistry and physiology of this problem, and who seem to prove pretty conclusively that the small amount of arsenic, if any, which reaches the cord after intravenous administration, even when this is supplemented by intraspinal injection the next day, is so small that it seems unlikely that any possible good effects in the treatment of cerebrospinal syphilis by the intravenous use of arsphenamine, or the intraspinal injection of blood serum containing arsenic, can be due to the presence of any of the drug in the cord, but must be explained in some other manner. They assert that when arsphenamine is given in therapeutic doses intraspinally none of it can be detected in the spinal cord. We presume that they refer to the use of arsphenamized serum rather than arsphenamine in solution.

These conclusions tend to confirm our belief that we have seen better results accrue in syphilis involving the brain and cord from the intramuscular injection of a 1-per-cent solution of biniodide of mercury than from the intraspinal injection of arsphenamized serum.

BLACKWATER FEVER.

From time to time during the last thirty years the THERAPEUTIC GAZETTE has published in its Original or Progress columns the results of clinical or other studies dealing with malarial hematuria and so-called malarial hemoglobinuria.

With the passing of years, the idea expressed many years ago by the writer of this editorial, that so-called malarial hemoglobinuria is not due to the malarial parasite, has been gradually gaining scientific proof. Experiments in the Canal Zone and elsewhere seem to indicate that some other parasite, or parasites, found in the tropics or subtropical districts are really responsible.

These facts, of course, raise the question as to whether the administration of quinine in the presence of so-called malarial hemoglobinuria is correct. It will be recalled that certain physicians, particularly in Greece, have claimed that the use of quinine, in doses which were supposed to be of such size as to be useful, has actually induced what is called blackwater fever, and if it is true that malarial hemoglobinuria has no relation whatever to infection by the malarial parasite, and it is also true that quinine has no effect on the microörganism producing hemoglobinuria, a distinct advance has been reached in therapeutics.

In the London *Lancet* of December 23, 1922, Wenyon makes a report upon this subject and admits that the etiology of that much-dreaded tropical malady, blackwater fever, is still obscure, there being no entirely satisfactory explanation of the sudden destruction of red blood-corpuscles with the production of hemoglobinuria. It is, of course, well recognized that the condition is closely associated with malarial infection, but it is also equally recognized that hemoglobinuria may occur in both man and animals without the malarial parasite being present. He quotes the belief of Blanchard and Lefrou that in all probability blackwater fever is not due to one etiologic factor, but to several, although these investigators believe that they have discovered in

the Belgian Congo an organism which is responsible for the development of this symptom. Wenyon well points out that if their observations are confirmed a most important advance has been made.

In one of the patients the illness was so grave that no history could be obtained; the other was admitted to the hospital with the statement that he had suffered from malaria, but at the time no malarial parasites were found in either patient. Careful examination of the blood of both of these patients, however (one of whom died, while the other recovered), revealed a microörganism which was in the form of filament 6 to 9 microns in length and 0.1 to 0.2 micron in breadth, possessing irregular curves and resembling the leptospira seen in infectious jaundice and in yellow fever. This microörganism was successfully inoculated in guinea-pigs, and the strain was at first enhanced in virulence, but later decreased. These guinea-pigs not only had a tendency to hemorrhage with the production of hematuria and the presence of blood in the peritoneal cavity, but the liver became markedly degenerated and yellow in color. Jaundice was present, which is interesting in view of the fact that other leptospira, as in those of infectious jaundice and yellow fever, will produce icterus, but not hematuria. Blanchard and Lefrou were, however, unable to cultivate this microörganism *in vitro*. They have given the name spirochæta biliohemoglobinuriæ as the cause of one type of blackwater fever. They admit that in the guinea-pig it causes hematuria and not hemoglobinuria, but think this is due to the high alkalinity of the blood of the guinea-pig, which has not the hemolyzing tendency that the more acid urine of man possesses, which, of course, presupposes that in blackwater fever the setting free of hemoglobin takes place in the kidney or in the bladder rather than in the blood stream.

It is interesting to note that Blanchard and Lefrou, unlike many other investigators, are not unduly enthusiastic in claiming that this organism is the sole cause of that form of hemoglobinuria which has usually been prefixed by the word malaria.

THE TRAUMATIZED JOINT.

The treatment of the injured joint without break of the overlying soft parts, attended by effusion into the joint; blood at first, or, in the case of slight recurrent trauma, serum; characterized by pain, which may be severe and is aggravated by motion, by tenderness, and by fluctuating swelling; and often by crippling pain and disability, is in the professional mind fairly well formulated: to wit, rest on a splint, elevation, if this be practicable, pressure by a bandage, and cold to lessen an undue inflammatory reaction. This treatment, when directed by the progressive surgeon or physician, is supplemented shortly by massage, limited in its severity and duration by the sensation of the patient, by light and heat in the form of an electric bulb, later by baking, and by passive motion. Thereafter, for days or weeks, depending upon the severity of the injury, guarded use, support being applied to the joint.

These joint injuries are perhaps most frequent in the knee. Whether they be caused by contusion or twist, if there be no cartilaginous or bony displacement the treatment now generally accepted may be wisely supplemented by another measure which will hasten a prompt convalescence. A large effusion into the joint is never helpful. Whether it be of blood or serum there is slow absorption, and a resultant pressure atrophy and weakening of ligamentous structures. Such effusions should be removed promptly. Failure so to do is probably incident to the shadow of a one-time very real danger, that of infection. This danger in careful hands and a clean clinic no longer exists. The indications for relief of tension with its consequent damaging effect upon local circulation are urgent and immediate.

In this relation McWilliams *(Annals of Surgery,* December, 1922) has presented a strong argument. He has headed his article "The Efficient Treatment of Acute and Chronic, Simple, Traumatic Synovitis (Hemarthroses and Hydarthroses) by

Repeated Aspirations and Immediate, Active Mobilizations without Splinting." He calls attention to the revolution accomplished by Willems in the treatment of purulent infections of the knee by incision without drainage tubes and immediate active mobilization. He quotes Lucas-Championnière, who favored mobilization forty years ago, and John Murphy, who advised repeated aspirations, but supplemented these by rest and traction. He quotes Willems to the effect that "It is now some years since my attention was directed to this problem (traumatic joint effusions), and I have freed myself by degrees from practicing the law of immobilization. I have commenced with evacuatory punctures to drain traumatic effusions of the knee, hemarthroses and hydarthroses, and by making the patients walk immediately. Not only could they do this without any difficulty, but their lesions cured in a few days without leaving any trace. My method of treating traumatic effusions by puncture, followed by immediate movements, was rapidly adopted by practitioners dealing with industrial accidents, owing to the great rapidity and perfection of the recovery and also owing to its great simplicity."

The immediate effect of the aspiration, which is simple and safe, is the relief of pain. The indications for repetition are reaccumulation of fluid. If the blood remain fluid at the time of its aspiration the beneficial effect from this procedure will be more prompt, particularly in the direction of immediate guarded use. Willem's claim is substantiated to the extent that the treatment is simple, safe, and efficient, the cure being more complete and accomplished in less time than the now classical method of rest and slow absorption by natural means.

In cases of hemarthrosis accompanied by fracture or displaced semilunar cartilage, reduction of displaced bone or of cartilage is, of course, the first step, and thereafter rest, massage, and possibly passive motion alone, unless it is obvious that voluntary movements will not cause displacement; but when these injuries are accompanied by large joint effusion, as they usually are, the logical procedure is to remove this effusion by aspiration, thus avoiding the atrophy and joint weakness which is the inevitable consequence of long-continued intracapsular tension; and of minor importance, but still with its distinct value, lessening the often exhausting pain from which these patients suffer and for the relief of which they require anodynes.

SUBCUTANEOUS VACCINATION.

Vaccination against smallpox, which still has its bitter opponents, even in the profession, has so thoroughly proven its efficiency and its desirability to both life and business interests as a measure of protection, that in some civilized countries the procedure is compulsory, each generation being protected in childhood, as proven by the presence of a visible and characteristic scar. Against this policy there are some troublesome protestants who for the public good are unwilling to submit themselves and their children to the inconvenience and slight risk of vaccination, holding that the sacrifice made by nearly all other citizens will reduce the danger of smallpox to such a minimum that their individual risk is negligible.

There is another small group of protestants who believe that vaccination, or any precaution against disease, is opposed to the will of God, and shows lack of confidence in his beneficent and guarding care.

There is a third group who are against all accepted practices excepting those hallowed by the centuries; some of these, subconsciously craving the limelight of publicity, become clamorous. In consequence of this nearly every legislature in this country has its time fruitlessly taken by these protestants against vaccination as

a compulsory measure. They are best silenced by so arranging that the hearing is brief and that no newspaper publicity is given either as to who appeared or what he or she said. In spite of legislation requiring that every child before admission to either public or private school shall have been successfully vaccinated, there are so many evasions that even in States apparently guarded by wise and efficient legislation the danger of smallpox epidemics, with their consequent loss of life, crippling, and tremendous involvement of business interests, is by no means negatived. Indeed year after year there is growing evidence to the effect that the country at large is approaching a wide-spread epidemic of this nature. This danger is in many cases due to weak laws; still more often perhaps to inadequate application of strong legislation. In Pennsylvania, for instance, where by legislative act a child can neither enter nor remain in school without a physician's certificate of successful vaccination, it was not until the law was so amended that no evidence or certificate of successful vaccination would be accepted in the absence of a visible scar that the authorities realized how largely the purpose of protective legislation had been thwarted. Examination of the school-children revealed in some cases and in some localities 20 or 30 per cent who had no visible scar of either a previous attack of smallpox or of a successful vaccination. Those pupils had all presented certificates of successful vaccination. A further examination showed that, contrary to law, physicians had issued these certificates at the time they vaccinated, not waiting for the appearance of the characteristic local reaction. In other cases a "successful vaccination" had been secured by internal medicament.

It is well recognized that smallpox vaccine deteriorates rapidly unless kept at or below freezing temperature; that in its transportation a brief exposure to conditions such as may obtain in a hot freight car may ruin an entire invoice; that the number of people naturally immune to vaccination is exceedingly small; and that the usual cause for the unsuccessful vaccination is deterioration of the vaccine. It is also recognized that the vaccination reaction of the partial or incomplete protection secured by a successful "take" is fairly characteristic, coming on much earlier than the true vaccination reaction and producing lesions much less marked. Indeed these lesions may produce no scar at all.

It is useless to deny that there is an element of danger in vaccination, not so great as to militate in the slightest against its universal application, but sufficient to justify the taking of every precaution. The danger is that of infection with the pyogenic organisms in association with the tetanus bacillus. It is avoidable by local cleanliness. When people by the hundreds of thousands are vaccinated and return to their homes, the conditions laid down for local cleanliness will many times be neglected. Thus it happens that there is an annual toll of death from this cause. It is this minute fractional percentage mortality which constitutes the only argument an anxious parent may adduce against the protection which he owes his children and through them the community in which he lives. He can be assured the danger is entirely abolished by cleanliness.

Since a scar is the only proof of protection against smallpox, and even then by no means an infallible one, it happens that the practice of vaccination by subcutaneous injection as practiced, for instance, by Goodall (*British Medical Journal,* Dec. 9, 1922) on six thousand soldiers, and which leaves no scar, is not one which serves the interest of public health, since it prevents medical inspectors from verifying the truth of medical certificates.

The method employed by Goodall was to inject beneath the skin the contents of about half a capillary tube of lymph, diluted up to 1 cc of water. There follows a reaction beginning after the second, third,

or fourth day, occasionally delayed, characterized by heat, tenderness, swelling, and sometimes extensive edema. Thereafter there remains a nodule which persists for several weeks.

The advantages claimed for this method of vaccination are that it does not leave a raw surface which may be infected, calls for no dressing, and incapacitates a very small percentage of those receiving it.

Major Goodall says it is comparatively painless. There is no convincing proof that by this method immunity is insured. Apparently there is no characteristic train of symptoms which can be seen, or may be followed by the eye, which shows that the take is real.

Perhaps the most important single point to consider from the standpoint of public interest is the absence of that scar which, when typical, is so reassuring to a health officer.

PHYSICAL FITNESS.

Whilst the term physical fitness is one conveying its idea, a brief analysis will show that this idea is something vague in so far as the constituents which make for physical fitness are concerned. It is broadly interpreted as the ability to meet promptly an emergency requiring effort, and to maintain for a reasonable length of time an effort out of the ordinary. Thus, a man who can run a mile in six, or even seven, minutes, thereafter eat a hearty dinner and go to bed at night and sleep soundly, feeling refreshed the next day, or can walk fifteen miles in five hours with no other ill result than perhaps tender feet or sore muscles, would be called physically fit.

Schneider *(The Military Surgeon,* January, 1923) indicates that a standard of physical fitness as formulated in tests for its determination before subjecting an individual to a possible or probable stress is by no means clearly defined, as suggested by the very vagueness of the terms which in the absence of organic lesions are used to indicate the absence of this fitness. Thus the words soft, tired, fatigued, exhausted, nervous, irritable, overtrained, undertrained, are one or all used to designate conditions each something different from the other, which indicate the lack of physical fitness.

As for fatigue, Schneider quotes the definition as the "sum of the results of activity which show themselves in a diminished capacity for work;" not an entirely satisfactory definition. He points out that "so-called fatigue may result in either an increased or a decreased resistance to the transmission of sensory stimuli throughout the central nervous system. Fatigue as ordinarily spoken of is a negative quantity, a diminished capacity for work; and yet some unusual necessity or new interest may drive an individual on past the place he would naturally stop because of fatigue, with the result that soon his output is as good or better than at any time during the work period; he has apparently been able to tap a new level of energy and has forgotten his so-called fatigue. The difficulties of definition have led Muscio to suggest that the term 'fatigue' be absolutely banished from precise scientific discussion."

The writer goes on to state that the tests are classified under those of performance and those of non-performance. The latter are based on observations on involuntary response. He quotes Muscio as opposed to the performance tests because of the disturbing factors which affect interpretation. These factors, particularly the emotional ones, may also affect the non-performing tests.

The author briefly describes some comparatively new tests for physical fitness, among them Martin's resistance strength tests in which the contracting power and resistance to pull of five sets of muscles are taken as the basis for estimating muscular strength.

Briggs has devised a method by which he determines between the normal and the overload. Thus, estimations of carbon dioxide output during work while the subject is breathing air, compared to that in the subjects breathing oxygen, show that the latter helps the unfit man little if any.

Much importance is given, and properly, to the various circulatory tests; the effect on the heart of exercise and the reaction following thereafter. It is generally recognized that in a man physically fit exercise produces a prompt rise in blood-pressure, which is maintained during work and drops quickly to normal on its cessation. The untrained fail to maintain the rise; during their exercise there may even be a drop. Barringer has stated that the fit man shows his high systolic pressure immediately after exercise, the unfit man somewhat later.

Schneider in regard to this test states that "it has been pointed out that in perfectly healthy men ten seconds after the end of a short period of vigorous exercise the systolic pressure is near the resting normal, and that it then rises rapidly and reaches a maximum twenty to sixty seconds later. However, a study by Mann of cases during convalescence from infectious disease apears to support Barringer's contention that a delayed rise indicates an overtaxing of the heart's reserve power."

In conducting a test for circulatory efficiency the pulse frequency is recorded after the patient has been lying down for five minutes; also the systolic pressure is taken. The patient is then directed to stand, and after two minutes the pulse and systolic pressure are again taken. Thereafter the subject is required to step five times up to a chair or platform 10½ inches from the floor; this in fifteen seconds. He puts one foot on the chair, holds it there, and steps up and down according to count. Immediately at the end of this exercise the pulse-rate is taken every fifteen seconds until it returns to its normal standing rate, the time required for this being noted.

In this relation, that is, bearing on tests for physical fitness and particularly for those which call for a high degree of efficiency, as for instance in the air service, Northington states that it is difficult to formulate a standard of qualifications that is immutable; however, the following, with omissions not applicable to the naval air service, are given by Longacre as conducive to efficiency and representing the optimum type: Youth, celibacy, good family history, few and only minor diseases, especially those with few complications and sequelæ.

"No operations or serious injuries, extreme moderation in use of or complete abstinence from tobacco. Liking for normal amusements—no evidence of excesses and dissipations. Evidences of manual dexterity—good at billiards, golf, sailing, violin, piano, horseback riding. Abstinence from alcohol and drugs. Good appetite and digestion. Normal sleep and absence of dreams; normal sexual tendencies. Good, active, sympathetic coöperation of family. Normal reaction throughout examination. Satisfactory physical examination. Personality showing.

"(*a*) *Temperament.* Cheerful, stable, self-reliant, aggressive, punctilious, serious, good coöperation in work and in examination, good sportsmanship, moderate tension, enthusiastic, adaptable.

"(*b*) *Intelligence.* Precise, penetrating, sharp, alert, resourceful.

"(*c*) *Volition.* Energetic, quick, deliberate or moderately impulsive, controlled, good tenacity of purpose."

It would seem that one possessed of all these desirable qualities would be both physically and mentally fit for every responsibility in life.

Progress in Therapeutics

Medical Therapeutics

The Digestive Complaints of the Cardiac Patient.

In the *New York State Journal of Medicine* for December, 1922, REILLY recalls the fact that many years ago the elder Broadbent stated that in the treatment of heart disease, the treatment of the stomach and nervous systems is more successful in placing the patient on his feet than is the treatment of the heart itself, and he believes that clinicians in general will bear out this statement.

The subject of the treatment may be divided into: (1) the management of the acute attack, and (2) of the subacute or recurring cases. In the management of the hyperacute attack, it is well to have ready on the tip of one's tongue, to be ordered over the telephone, if need be, a regular sequence of remedial measures to be employed:

1. A glass of hot water with one teaspoonful of soda bicarbonate.
2. Clove water, made by dropping a dozen whole cloves in a glass of boiling water and allowing it to stand five to ten minutes, then drinking the solution.
3. Hoffmann's anodyne (always to be kept in the home of cardiacs).
4. Aromatic spirit of ammonia.
5. Jamaica ginger, or any household carminative.
6. A simple enema.
7. This prescription:

   Spt. ammonia, aromatic, ʒiv;
   Spt. chloroform, ʒij;
   Tr. zingiberis, ʒij;
   Tinc. lavandulæ co., q. s. ʒvj.
   Sig.: fʒj every two hours.

8. Mustard plaster over stomach.
9. Turpentine stupe.
10. Turpentine enema.
11. Turpentine by mouth.
12. Milk of asafetida enema.
13. Caution the patient to avoid gulping or air swallowing.
14. Use Rehfuss tube.
15. Stomach tube. Ordinarily, in a manifestly ill cardiac, the suggestion to use a stomach tube for either persistent vomiting or for flatulence and distress will be viewed with horror. No one wants the patient to die while such an operation is being performed, but he has never seen any one seriously injured by the performance of stomach lavage. On the other hand, he has seen relief and sleep that could not be secured by morphine. In a severe case, resisting all of the ordinary measures, it is of inestimable benefit. Auto lavage may sometimes be practiced, but as a rule the general prostration and distress following vomiting is more of a strain than the retching resulting from passing a small stomach tube. The passing of the Rehfuss tube and washing through it will sometimes avoid the use of the larger tube.
16. Pituitrin (surgical), 1 cc by hypo.

If there is any reason to feel that the trouble is likely due to colon distention, a simple enema will often effect the quickest and most satisfactory relief. If high blood-pressure is present, nitroglycerin, grain 1/100, under the tongue often gives relief. It should always be tried early in the high blood-pressure cases.

Don't give strychnine, except for moral effect.

Don't give morphine or digitalis.

Don't neglect to reassure the patient. He may not say he is frightened, but in most instances he is secretly alarmed.

Don't get excited.

Generally the clinical picture is rather that of recurring attacks, with a varying interval, until finally, in the bedridden patient, he suffers continually after each meal. These cyclical attacks occur with considerable degree of regularity. It is an open question whether the underlying cause is a fresh infection or whether these attacks are in the same category with other cyclical

disturbances, such as migraine, epilepsy, menstruation, etc. Personally, he is quite sure that many such digestive attacks in normal individuals are of a cyclical nature.

In the management of recurring cases the diet is of utmost importance: (1) Dry diet—this means that these patients should not be allowed any liquids with their meals, nor within an hour after the meals. This is the most difficult rule to enforce; one must explain the ptotic result of ingestion of liquids with meals to secure the patient's coöperation. A diet list should be furnished each patient. (2) No condiments—this includes celery, radishes, etc.; flatulent foods, such as cabbage, beans, onions, and bananas, are forbidden. No raw fruits, butter, fats, cream, cheese, or eggs. The liver efficiency test, as suggested by Widal, goes far to prove the time-honored clinical observation that these fatty foods are not well borne by the liver.

In the performance of this test, which may be made by any one, a blood count is taken before the meal, and again an hour afterward. With a normal liver there is an increase of the leucoctyes of approximately two thousand. If there is an insufficiency in the liver function, from any cause, this increased leucocytosis does not occur, and often there is a diminished leucocytosis. It is necessary that no food be ingested for at least six hours before meals. At Fordham Hospital about two years ago, this test was tried out in a group of decompensating cardiacs with large livers, and in approximately seventy-five per cent of the cases leucocytosis did not occur within an hour after the meal. In a few cases in which no liver enlargement could be made out, and yet the patients were suffering from some of the minor symptoms of cardiac failure, there was no increased leucocyte count. Widal believes that it is due to a protein shock reaction on the liver function. In spite of his lengthy argument, it seems to Reilly that it is due rather to the reaction against the fats than against the proteins. At any rate the test opens up a fruitful field for research.

When milk is taken, it preferably should be skimmed milk. Tea or coffee should not contain cream or milk, nor should food be taken with either of them. However, a dry roll is often permissible with coffee. Cocoa and chocolate in any form is not allowed. Soups are generally condemned. He has found that meat, in small quantities, is not badly borne, provided the other rules above mentioned are followed. Many of these patients say that meat does not agree. The disagreement is most often due to: (1) either too much is ingested, or (2) fluids are taken at the same time. Unless a personal idiosyncrasy exists, meat in small quantities is not harmful, provided that there is not also present an advanced interstitial nephritis. A urine with a sp. gr. over 1.015 at all times, with a normal urea output, even though there is a trace of albumin and casts present, does not warrant any restriction in protein intake. In fact, a fair but not excessive protein diet is indicated, and often transforms the disheartened, dejected invalid into one who can earn his living. Cold drinks and unfermented juices must be avoided. Lemonade is a common offender. No salt should be put on the tray, especially if edema is present. No exercise should be allowed within at least one hour after meals. The meals should be eaten slowly. In every case not readily responding to treatment, the colon must always be viewed as a likely cause of the distress, and above all else constipation must be avoided. The first thing to do for the recurring attacks is to administer a dose of castor oil; no other agent acts quite so well in temporarily ridding the bowels of gas. In some patients a daily enema is satisfactory. Others are much prostrated after enemas. Care should be taken not to use a flatulent cathartic, such as magnesium citrate. Thin cardiacs bear salines badly—in plethoric patients they do well. As a rule, for continued use, one of the vegetable cathartics, as "cascara aromatic," every evening after supper is preferable. As a matter of fact death at stool is a common form of death among cardiacs. In his essay on "Death," Lord Bacon calls attention to this fact:

In the Rome of the Cæsars, whenever an emperor died he became a god. The Emperor Otho, who was suffering from cardiac disease, while seated at stool, feeling life ebbing away, exclaimed, "Ut puto, ut Dei," which may be rendered as "I sit at stool; I become a god." If high blood-pressure is present, a bi-weekly dose of castor oil is better as a cathartic, provided prostration does not follow. Occasionally, however, such a patient is much prostrated by its use. In cases in which digitalis is indicated, after digitalization has been accomplished, medicines of this series should not be given in more than two daily doses. Opiates, when indicated, are best combined with a laxative such as:

Tr. opii deodorati, f3jss;
Fl. ext. cascara aromatic, f3jv;
Elix. adjuvans, q. s. ad f℥ij.
F℥j, q. i. d.

In all cases, during the cycle of the attack, an alkali, either in the form of soda bicarbonate or magnesia, or both, should be given half an hour after meals and at bedtime. The rationale is the same as in any other disturbance of stomach motility. It forces the opening of the pylorus. In spite of the low acidity present, hydrochloric acid has not been serviceable in his hands. Inasmuch as hyperexcitability of the vagi is responsible for so many cases wherein one cannot incriminate the faulty motility as being due to either abdominal pathology or faulty food, it is good practice in such cases to begin with a course of bromide: 20 to 30 grains of bromide of soda with equal amounts of cinnamon water and milk of magnesia after meals. This is generally in the first instance a good routine prescription. He suggests this prescription as a refuge for the dispensary physician when he has not time to unearth the cause of the flatulence. In other instances the following prescription has served him well, especially when epigastric pain was complained of:

℞ Chloral. hydratis, 5jss;
Sod. hyposulphitis, 3ij;
Aq. menth pip., q. s. ad f℥ij.
F3j. a. c. in water.

This was originally suggested by H. A. Hare for painful digestion.

In all high blood-pressure cases in which the flatulence comes on shortly after getting up from the table, 1/100 gr. or less of nitroglycerin should be given immediately after the meal, and before the patient gets up from the table. From time to time carminatives such as asafetida, ginger, creosote, peppermint or oil of cloves must be employed. Many of these patients suffer from potential visceroptosis, which only becomes troublesome during the cycle of the attacks. In a large proportion of cases the application of two or three strips of wide adhesive plaster across the abdomen is of utmost service. The use of plaster in this way is often one of the most satisfactory procedures in the management of these patients. This is particularly true in long-waisted people. Inasmuch as patients are fairly free from symptoms between attacks, this may avoid the purchase of an abdominal support. The peroxides of magnesium have not been successful in relieving gas in his hands. As has been stated many times, in all complaints for which a large number of remedies have been suggested, it is not possible to successfully treat them by any one method. Careful attention to the eight factors so prominent in favoring the production of flatulence, and observation of the minor details of hygiene, rest, and food, are more often crowned with success in the sense of lessened distress than from any single specific prescription.

Management of Head Injuries with Real or Potential Brain Damage.

DOWMAN, in the *Journal of the American Medical Association* of December 30, 1922, concludes that all head injuries should be carefully studied and the type of injury properly estimated before the institution of any particular treatment.

No treatment is of avail in those cases of massive brain injury presenting evidence of rapid exhaustion of the medullary centers.

The treatment of middle meningeal

hemorrhage can be greatly facilitated by ligating the external carotid artery.

The technique advised by Cushing in the treatment of war wounds of the skull and brain should be used in the treatment of those cases of brain injury in which there is localized brain contusion.

Subtemporal decompression is still the treatment of choice in cases of brain injury when there is evidence of gross brain laceration, and the patients are yet well within the so-called period of medullary compensation.

Saturated magnesium sulphate solution by mouth will prevent the occurrence of increased intracranial pressure due to fluid accumulation and thereby prevent the necessity of late operation in many cases of brain injury in which immediate operative intervention does not seem to be indicated.

Saturated solution of sodium chloride intravenously is of inestimable value in relieving acute increased intracranial pressure due to fluid accumulation occurring several days after head injuries, with definite brain injury.

The Present Therapy of Pneumonia.

In an editorial on this subject the *Boston Medical and Surgical Journal* of December 7, 1922, states that Osler's "Captain of the Men of Death" has ridden triumphantly among us for many years, his toll of lives scarcely affected by the earnest attempts that have been made to unseat him. Now that the vanguard of his army is sending its scouts through crowded cities and scattered hamlets it may be well to take account of stock and see what are our most effective weapons of defense.

Specific antigens or vaccines have seldom been proven of great value in the active treatment of acute infectious diseases. Pneumococcus vaccines for treatment and prevention have been experimented with largely, and their use often been advised, but strong proof of their efficacy in their present stage of development is still questionable. It is not our purpose to discourage attempts in this still fruitful field, but it would be unwise to place too much reliance on an insufficiently tested weapon.

The Rockefeller Type I serum has been extensively used and has apparently met with considerable success in the treatment of favorable cases of this type of lobar pneumonia. Its use, however, even in the specific type, is limited, and some investigators entertain doubt as to its practical value. The secret of its success, where success has been attained, rests in its earliest possible administration, as with antitoxin. After the fourth or fifth day of the disease little benefit may be expected from its use. The case must be typed early, serum injected according to the Rockefeller technique, with due regard to the dangers of a preëxisting protein sensitization, and the dose must be repeated at frequent intervals as long as the temperature stays up, or until at least six doses have been given. As with all biologic therapy or with therapy in general, to a greater or less degree, the possibility of failure must be reckoned on.

Potent and effective sera have not yet been developed for Types II and III pneumonias, and Type IV forms a heterogenous group that does not lend itself to specific antibody formation.

The general treatment of pneumonia has been one of the duties of the practitioner since the day of Hippocrates, and but little need be said concerning it. Fresh air has been indicated in all respiratory diseases, but it is believed that the use of *cold* fresh air may be abused. Zero temperature may be an ordeal difficult to endure, and a plea for moderation in this respect is in order. Fluid should be forced, nutrition maintained, and distention avoided; further treatment concerns the comfort of the patient, which can often be attained by the use of the head-rest, the chest swathe, and the judicious employment of sedatives and narcotics. Many men still make a routine practice of cardiac stimulation. In extremely dyspneic cases oxygen, by the Barach method or with the mouth tube, is a factor

for comfort and may even turn the tide of life or death. Empyema must always be suspected with a prolonged temperature or increased respiratory embarrassment, but without increased discomfort the use of the needle may be cautiously delayed. Empyema, unless extreme, should not be operated on in the presence of pneumonia. The prognosis of streptococcus empyema is improved by closed drainage, as was strikingly shown in army experience.

The Emergency Treatment of Water for Drinking Purposes.

In the *Military Surgeon* for December, 1922, HITCHENS states that iodine has been used to a considerable extent for the emergency treatment of drinking-water, but its value is apparently not so well known as it deserves to be.

The standard tincture contains 7 per cent of iodine, and 5 cc of this in a Lyster bagful of water will render even raw Potomac River water safe for drinking after a delay of about thirty minutes. This is approximately equivalent to one drop in a quart, and means that the soldier, traveler, or tourist may render polluted water safe for drinking if he adds one drop of tincture of iodine to a canteen or a one-quart thermos bottle full of water.

There are two possible objections to the use of iodine: The first is that in the case of persons with hyperthyroidism iodine may cause unpleasant symptoms, but persons with this condition should not be attempting to do field duty. The second is that we are unable to titrate the water for excess of iodine in the case of a heavily polluted source. This might be a serious objection, but the amount suggested is probably sufficiently in excess to take care of any but excessively polluted water. Its expense compared with chlorine makes it only an emergency substitute, so that when it becomes necessary to call upon iodine these objections carry relatively little weight.

In the Lyster bag, the excess of iodine may be removed, just as in the case of chlorine, by the addition of 1 gramme of sodium thiosulphate.

Upon the supply table of the Medical Department of the United States Army are two sources of iodine in addition to the tincture. These are "iodine swabs," the tubes of which contain 1½ cc of 3½-per-cent solution of iodine, and "iodine-potassium iodide" in dry form in sealed tubes for making 50 cc of a 2-per-cent solution of iodine. It is obvious that 10 cc of the "swab" solution or 17½ cc of the 2-per-cent solution would be equivalent to 5 cc of standard tincture. By actual tests the efficiency of all these solutions has been demonstrated.

The Management of the Tuberculous Patient.

In *The Journal-Lancet* for December, 1922, MYERS states that sanatorium treatment should be recommended strongly for all cases of active pulmonary tuberculosis. If sanatorium treatment is impossible, an attempt should be made to carry out the sanatorium routine at home.

Education of the patient as to the nature and treatment of the disease is one of the most important factors in treating pulmonary tuberculosis.

Heliotherapy is a valuable aid in treating tuberculosis, but should always be employed in conjunction with the rest treatment.

Artificial pneumothorax may be employed in only about 10 per cent of the patients who apply for treatment to-day. When this procedure is possible it usually makes the prognosis about 50 per cent more favorable.

Postural rest may be used with real benefit to the patient in a large percentage of pulmonary cases. Recovery is often hastened weeks or months when this method of treatment is carefully carried out.

In the treatment of pulmonary hemor-

rhage rest and posture are important. Narcotics in small doses are often indicated. In extreme cases one should resort to artificial pneumothorax.

Backache.

DAMESHEK, in the *Boston Medical and Surgical Journal* of December 7, 1922, in concluding a paper on this topic lays emphasis on the following points:

Backache is probably the most common symptom presented for diagnosis and treatment.

The cause of chronic backache (aside from hypertrophic arthritis) is unknown, although it probably is postural in origin.

Subluxation or relaxation of the sacro-iliac joints is an explanation not supported by facts, and is probably of extremely rare occurrence.

The cause of chronic backache with limitation of motion, peculiar attitudes of standing, and severe pain, may be due to a chronic synovitis with the formation of adhesions between the sacrum and ilia. Rational treatment is, therefore, the breaking of these adhesions.

Backache is almost invariably associated with other indefinite disorders, such as constipation, visceroptosis, and neurasthenia, and the treatment should include all of these.

Backache is slighted and improperly treated by the great majority of physicians and clinics, resulting (*a*) in great economic loss to the patient (1) who goes from doctor to doctor, (2) who is prevented from doing efficient work, and (3) who may become a chronic invalid; (*b*) in loss of prestige of the physician; (*c*) in the popularity of the healing cults.

Most cases of chronic backache could be properly treated, with good chance of cure, if enough time and thought were given them.

The treatment should be detailed and sympathetic. It is: (*a*) General—In which measures against constipation, visceroptosis, underlying complexes, wrong methods of standing or walking, gynecology, are considered. (*b*) Local—(1) For mild cases, a belt or adhesive strapping; (2) for more severe cases, a course of rest, and then a tight corset, as suggested by Lovett; (3) for severe cases, the breaking of adhesions by manipulation—the osteopathic method.

Backache could be advantageously treated in classes at the hospital.

The Effects of Alcohol on Gastric Digestion.

In an editorial on this subject in the *New York Medical Journal* of December 6, 1922, it is stated that much has been written in respect to the effects of alcohol on gastric digestion, and it would seem that in the present state of our knowledge many observers have gone too far by eliminating alcohol and alcoholic drinks in all patients complaining of gastric disturbances of no matter what nature. It is undeniable that alcohol may render great service in certain affections of the stomach. In healthy individuals a small dose of alcohol—fifteen cubic centimeters of brandy—taken at meals increases the quantity of gastric juice, likewise its content of hydrochloric acid and its digestive capacity. A larger dose—fifty cubic centimeters of brandy—given after meals always increases the gastric secretion, while digestion is in no way interfered with. If the same dose be given before a meal it affects the digestion unfavorably.

The effect of alcohol is not due to a direct action on the gastric mucosa, because a certain time is necessary for it to be produced. It is probable that alcohol—which is very rapidly absorbed by the gastric mucosa—acts on the central nervous system, and, by its intermediary, on the secretory nervous system of the stomach.

Considering the action of alcohol in various pathological states of the stomach it can be said with a fair degree of certainty that in hyperacid dyspepsia and ulcer, alcohol increases both the content of hydro-

chloric acid and the total acidity. Hence it increases the pyrosis and pain in these subjects and is therefore to be proscribed.

In gastric cancer alcohol has no action on the gastric secretion, but it frequently alleviates the pain, controls nausea and the sensation of plentitude of which these patients complain. In nervous dyspepsia the use of alcohol is favorable in elderly subjects with hypochlorhydria and hypoacidity, on the condition that it be taken with meals. It must be prudently exhibited in women and young people. The use of alcohol is to be recommended in achylia and chronic gastritis on account of its activating action on the digestion, and in several instances it has been known to cause the hydrochloric acid to reappear in the gastric juice from which it had previously been absent.

In elderly people there is frequently a marked decrease of free hydrochloric acid, and if they present digestive disturbances due to a secretory and motor insufficiency, the moderate use of alcohol may be most effective in relieving the condition. As to alcoholic drinks—beer and wine—their action is the same as that of alcohol but more complex, because other factors (extractive matter) intervene. Beyond a certain concentration alcohol completely arrests gastric digestion from precipitation of pepsin. Hence the limit of alcohol in the gastric contents must never exceed ten in one hundred.

Effect of Magnesium Sulphate on the Liver and Biliary Apparatus.

HEMMETER, in the *New York Medical Journal* of December 6, 1922, states that when magnesium sulphate is introduced through the duodenal tube two effects have to be borne in mind: first, the immediate effect that produces a relaxation of the sphincter of the papilla of Vater, the so-called sphincter of Oddi. The neuromuscular arrangement between this sphincter and the gall-bladder is such that when the sphincter at the outlet of the gall-duct opens, the musculature of the gall-bladder contracts, and *vice versa*, when the sphincter of Oddi contracts, the gall-bladder relaxes (Doyon). The first effect of magnesium sulphate injected into the duodenum is to produce an evacuation of the bile already collected in the common gall-duct and in the gall-bladder. The gall-bladder once emptied, immediately a refilling of this receptacle begins from the intrahepatic larger bile ducts.

The liver is a contractile organ, and it is not necessary that bile should be formed anew at the beginning in order to fill an emptied gall-bladder. There is enough ready formed bile in the larger intrahepatic bile vessels to fill the gall-bladder completely a second time without assuming that the second filling is due to newly formed bile.

Now when the gall-bladder is emptied a second time, and the liver having now emptied its larger biliary vessels, a new formation of bile takes place, and this can occur when the magnesium sulphate is injected directly into the circulation.

Sulpharsphenamine.

VOEGTLIN, JOHNSON and DYER, in the *Public Health Reports* from the United States Public Health Service, of November 10, 1922, state that the data which they present show that sulpharsphenamine is an arsphenamine derivative very closely related in chemical structure to neoarsphenamine. This slight change in chemical constitution, however, imparts to the drug certain definite advantages over neoarsphenamine, as (1) ease of manufacture, (2) great stability of drug in the dry form and in watery solutions, (3) constancy of toxic and parasiticidal action of different lots, and (4) suitability for hypodermic administration. Every one of these advantages is of far-reaching importance, when consideration is given to the fact that enormous numbers of doses of arsphenamine are used in the control of syphilis.

As far as the experimental evidence is concerned, the above mentioned advantages of sulpharsphenamine are firmly

established. However, they strongly emphasize that before this drug can be introduced for general use, it will be necessary to give it an exhaustive trial as to its curative power in human syphilis. There is no way to predict the outcome of this trial. The clinical studies especially will have to consider whether or not sulpharsphenamine has, for normal and syphilitic tissue, the same penetrating power as, or better than, arsphenamine and neoarsphenamine. After all, the main difficulty with the arsenicals in present use appears to consist in their failure to reach the last spirochetes which may be buried in lesions that are difficulty accessible. It is obvious that incomplete sterilization of the patient due to this cause will prevent a cure and will cause, sooner or later, clinical relapses. In this respect syphilis differs markedly from diseases due to organisms which are closely related to *Treponema pallidum*. Yaws and relapsing fever may be cured with a single injection, or a few injections, of arsphenamine. This is of particular significance in view of the fact that the parasite responsible for yaws is morphologically and in other ways so similar to *Treponema pallidum* that certain investigators consider the former as merely a different strain of the latter organism. Hence, the most reasonable explanation of the difference in the curative power of arsphenamine in syphilis, on the one hand, and yaws and relapsing fever on the other, is probably to be found in the specific pathology of syphilis, which favors the hiding of parasites in recesses inaccessible to arsphenamine. They suggest that sulpharsphenamine be given a clinical trial, particularly in patients whose veins are difficult to reach (adipose patients, infants), and cases which exhibit an unusual idiosyncrasy to intravenous treatment.

In view of the fact that the parasiticidal action of sulpharsphenamine is slower than that of the arsphenamine, the former drug might be of use in cases with indications of an extensive syphilitic involvement of the cardiovascular system, in which a slow action of the remedy is desirable. Under these conditions a subcutaneous injection of sulpharsphenamine should be of value on account of the gradual absorption of the drug.

The Vagaries of Infant Feeding.

In an editorial on this subject the *Boston Medical and Surgical Journal* of December 14, 1922, recalls the fact that few phases of medicine have been in such a state of flux during the last twenty years as infant feeding. In Boston the percentages have been calculated to a nicety and the babies have done well. Elsewhere (and now in Boston) babies have been fed on whole milk dilutions based on their protein and caloric needs for body weight, and they have done well. Many types of sugars and starches have been used, and the milk protein has been modified by many methods. Buttermilk has been mixed with Karo corn syrup. Milk has been dried and redissolved. It has been peptonized. Protein milk has been used for certain disorders, with and without the addition of sugar.

One of the more recent developments has been that of the butter-flour mixture, introduced in 1918 by Czerny and Kleinschmidt. The original formula consists of butter 7 grammes, flour 7 grammes, cane-sugar 5 grammes, and water up to 100 cc, the butter being first cooked, then the flour added, and the two cooked together until brown. The resulting butter soup is mixed with boiled whole milk in varying proportions dependent on the weight of the infant to be fed.

Brown, Courtney, and MacLachlan, in the *American Journal of Diseases of Children* for November, 1922, describe their modification of this mixture, consisting of butter 7¼ teaspoons, cane-sugar 5¼ teaspoons, flour 14¾ teaspoons, and water 17½ ounces. This changed butter soup with its higher starch content is also added to whole milk. Excellent results have been obtained by many observers with some type of butter-soup feeding, especially in the

new-born and in cases of chronic malnutrition and difficult feeding with no particular symptomatology. Its use is advised against in acute conditions and in those where an intolerance to one or more food constituents is present.

The use of boiled butter instead of cream in modified milk formulæ is advocated by Lowenburg, speaking before the Philadelphia Pediatric Society. He finds that boiling sweet butter for two minutes reduces the fatty acid content by more than half, or to a much greater degree than occurs by boiling cream. Butter so boiled can be added to skimmed milk in considerably greater quantities than can cream, without causing digestive disturbances.

The conclusions that they are forced to reach are that infants thrive on fat, carbohydrate, protein, salts and water, and that the types and quantities of these principles can be varied considerably as to kind and quantity without untoward results, and often with probable benefit. The only warning they would issue is that experiments be kept within the bounds of safety and be not performed by those who are untrained in the art of infant feeding and incompetent to judge their results.

Stomach Trouble and Syphilis.

STOKES and BROWN, in the *American Journal of the Medical Sciences* for December, 1922, state that of 200 syphilitic patients who complained of stomach trouble, 70 per cent had neurosyphilis, 20 patients (10 per cent) had organic lesions (syphilitic or non-syphilitic) of the gastro-intestinal tract, 9 (5 per cent) had lesions of the heart, and only 4 per cent had true syphilis of the stomach.

The history of syphilitic infection is unreliable. Men give such a history three times as often as women. Sixty per cent of the men and seventy per cent of the women could not give histories of secondaries. Only two-thirds of those with histories of infection were diagnosed in the primary stage.

In only 36 per cent of the whole series of patients was syphilis recognized before they came for study.

The medical diagnoses made before their examination were apparently largely based on history (90 per cent) and blood Wassermann reaction (65 per cent). After examination the diagnoses were based most often on history (60 per cent), spinal fluid examination (59 per cent), and blood Wassermann reaction (44 per cent).

Only 10 per cent of the patients had had spinal fluid examinations, yet 59 per cent were positive. The test deserves greater popularity.

Only 44 per cent of the patients gave Wassermann positive reactions on the blood, and 56 per cent gave negative reactions largely as a result of treatment elsewhere. The greater diagnostic importance of the spinal fluid examination is again suggested.

Seventy per cent of the patients with persistently Wassermann negative bloods not due to treatment had positive spinal fluids.

Negative blood Wassermann and negative spinal fluid do not exclude neurosyphilis as a cause of gastric complaints. Of 32 such patients, 40 per cent had gastric crises with neurologic evidence of tabes dorsalis.

They suggest that the seat of the lesion in patients with gastric crises and negative spinal fluid examinations is in the vagus, the abdominal ganglia, and the sympathetic system.

Fifty per cent of 122 patients had hypoacidity and 38 per cent were normal. Hyperacidity was rare.

Of 132 patients having Roentgen-ray examinations, 84 per cent were negative and only 6 per cent showed definite or doubtful syphilitic lesions.

"Gastric neurosis" and "functional stomach" are dangerous diagnoses, if any suggestion of syphilis is present. In 50 per cent of these cases blood Wassermann

reactions were positive, and in more than 50 per cent the spinal fluids were positive.

Eighteen per cent of their patients with stomach trouble had had needless operations, 80 per cent before coming under observation. In all but 2 of 35 patients there were clues to the underlying syphilis, which were not followed up, or a negative blood Wassermann reaction that had been accepted as final, when other evidence of syphilis could have been found.

One-third of the needless laparotomies were on patients with gastric crises.

When the question of operable malignancy is raised, exploration should precede a therapeutic test for syphilis. If there is no reasonable probability of an operable malignancy being present, or if the lesion appears inoperable with syphilis present, treatment for syphilis should precede operation.

A general raising of the "index of suspicion" for syphilis, among internists and surgeons, would reduce operative mistakes in patients with abdominal symptoms. A blood Wassermann test is often insufficient to clarify the situation, but should at least be routine."

Surgeons should not ignore positive Wassermann reactions obtained before operation.

The results of treatment for syphilis in 109 cases in which patients remained for treatment were gratifying. Seventy per cent improved, 43 per cent were relieved of their complaint.

Treatment for syphilis underlying a gastric complaint must be directed according to the special indications in the case, and must not be merely general. Different methods will be required for underlying syphilis of the nervous system, the stomach, or the heart, for example.

They observed striking symptomatic improvement in certain cases of gastric and duodenal ulcer in neurosyphilitic patients in whom the Roentgen ray after treatment showed the lesion itself to be still present.

The spinal fluid examination stands out from this investigation as a procedure of the highest importance, outranking the serum Wassermann reaction in diagnostic syphilology as applied to internal medicine. Its wider use for diagnosis should be developed with proper facilities for its performance and control.

The So-called Angioneurotic Eruptions.

RAVOGLI, in the *Ohio State Medical Journal* for December, 1922, states that the treatment which has given the best results in his hands has been the administration of calomel in small doses of 1/5 to 1/3 of a grain together with sodium bicarbonate, repeated two or three times a day. Calomel has a specific action against the yeast fungi which remain in the gastro-enteric canal, and against the colon bacilli. At the same time the use of sulphate of magnesium with sulphate of sodium is beneficial, removing excretory substances from the system. Bicarbonate of sodium and citrate of potassium restore the alkalinity of the blood and remove acidosis.

In obstinate cases the administration of salol, together with bicarbonate of sodium as an antiseptic for the bowels, has given good results, and obstinate cases of chronic urticaria, of dermatitis herpetiformis, have yielded to this treatment.

Carbon Tetrachloride in the Treatment of Hookworm Disease.

LAMBERT, in the *Journal of the American Medical Association* of December 16, 1922, states that the dose given is 0.2 cc (3 minims) to the year of age, up to the age of fifteen, when the adult dose of from 3 to 4 cc (from 45 to 60 minims) is reached. The maximum dose depends on the size of the adult. It may be shown later that much larger doses than this can be given safely.

Children take the drug, in this dosage, better than adults. Three cc (45 minims) has been given to many adults over eighty

and to one man of ninety-three. The dosage indicated is administered to all ages from two years upward.

The drug is administered by placing it on a tablespoon or in a small glass, covered with water, and swallowed. It has a faint smell, reminding one of carbon disulphide, but no taste. When swallowed it may produce a sensation of heat. At first no preliminary purge was given, and magnesium sulphate was taken if the bowels did not act. Later, it was found that most symptoms were eliminated by a routine dose of magnesium sulphate administered three hours after the drug. To obtain the best results the drug was given on an empty stomach. A mild laxative on the preceding day proved beneficial when the patients suffered from constipation. Though the patients were advised to rest for the day, they did not do so, and nearly all of them carried on their usual work.

The symptoms seem to depend on the amount of absorption of the drug by the human host. The drug itself is a purge when taken in sufficient dosage on an empty stomach. The purgative action seemed to be diminished or lost, however, when the medicine was taken by one suffering from constipation, or when food had been taken just before or just after the drug. It is in these cases that symptoms of absorption occurred. These symptoms seem to be the same as those exhibited by a person recovering from chloroform anesthesia. The commonest is a dull headache, which may last for two or three days and is best relieved by free purging with magnesium sulphate. A few patients reported nausea and vomiting; many were sleepy for several hours after taking the medicine, and a few who followed directions to the letter said that they had suffered from headache. Since magnesium sulphate has been given as a routine measure, headache symptoms have rarely been reported. With the cases under control no symptoms are ever heard of. Recently at Nukulau Quarantine Station, 360 Indian immigrants were treated with somewhat larger doses, and not a single person had nausea or vomiting or reported a headache.

The tests seem to indicate that there was most absorption when there was no purge; that there was some absorption when the preliminary purge was given; and that there was almost none when the purge was taken several hours after the drug. The fact that not a single death has resulted among the 20,000 people who have been treated with an adequate dose of the drug, administered by relatively uneducated Fijian and Indian assistants, speaks for the safety of the medicine. Legal action has forced no one to take the treatment, and the fact that with such a small staff so many persons have been treated in so short a time demonstrates that the drug is easy to take, and produces few symptoms. Such urinary records as have been secured have shown nothing pathologic. The action of the heart seems to be slowed a few beats a minute for two or more hours.

Alcohol is a contraindication. The severest symptoms have been found in those who have taken alcoholic drinks in the period intervening between several hours before and several hours after taking the drug. The ingestion of food just before or after taking the drug produces a very constipating effect and results in increased absorption.

Carbon tetrachloride, in the dosage here given, is not so effective a vermifuge as oil of chenopodium for removing ascaris, only 40 per cent of them being removed by the Fijian tests. This is regrettable, particularly in Fiji, where there is so high a rate of infestation with this parasite.

The drug occasionally removes *Trichocephalus dispar* in small numbers, but it does not cure the disease. It seems, however, to remove *Oxyuris vermicularis* in large numbers.

He concludes: (1) Carbon tetrachloride is a vermifuge and vermicide of great potency. (2) It gives little discomfort to the patient. (3) It permits of rapidly

treating, at a low cost, vast populations suffering from hookworm disease. (4) Reëxamination of the feces of 823 treated patients indicated that one treatment administered to each individual in a given area had lowered the original infection rate of 100 per cent to less than 9 per cent. (5) Clinically, the standard of health of the community is immediately raised.

Comparison of the Action of Quinidine with Other Cinchona Alkaloids in Auricular Fibrillation.

GRANT and ILIESCU, in *Heart* for December, 1922, conclude that in clinical fibrillation of the auricles the rate of the auricular oscillations is reduced by the four alkaloids quinidine, cinchonidine, cinchonine, and quinine. The alkaloids are named in the order of their relative potency; this order is almost constant, and such exceptions as occur are trivial.

The relative effects on the ventricle are differently ordered; the ventricular rise is earliest and greatest under cinchonine, which appears to possess a special action in this respect; quinine has little or no action on the ventricle in the doses given; quinidine and cinchonidine occupy an intermediate position.

The rise of ventricular rate which occurs in cases of auricular fibrillation treated with test doses of quinidine, hydroquinidine, cinchonidine, and cinchonine is usually preceded by a brief preliminary fall of rate.

Artificial Pneumothorax.

KALB, in *Northwest Medicine* for December, 1922, states that pneumothorax is classed as partial, effective, and complete. Partial pneumothorax is where only a very small amount of air can be introduced. One should not give up the case as being unsuited until a number of efforts have been made to increase the pocket and to break down the adhesions. While a partial pneumothorax may benefit a patient, it was necessary in his series to discontinue the treatment in twenty per cent because of inefficient collapse. An effective pneumothorax is one where there may be many adhesions, but where a sufficient amount of air can be introduced to bring about results. Fifty per cent of his cases were in this class. A complete pneumothorax is one in which the entire lung is collapsed. This he obtained in twenty-five per cent of his cases.

It was thought, early in the history of this treatment, that by the fluoroscope, *x*-ray plates, and by the use of the stethoscope, one could make a diagnosis of adherent pleura. He does not feel that this is possible, for in many cases in which the disease had existed for as long as ten years, in which there was a history of frequent pleurisy, in which the *x*-ray showed a thickened pleura, and in which the breath sounds were very limited, pneumothorax was often more easily produced than in other cases without such findings and history.

The area to select as the site for injection is the one most likely to be free from adhesions. The midaxillary line is preferred, because here the intercostal spaces are wide and the overlying tissue thinner than elsewhere. The places to avoid are those over cavities, the precordium, the region over large vessels, the mammary tissue in women, and the region posteriorly below the ninth interspace.

It is interesting to note that the use of the manometer was first introduced in 1905. It has rendered the creation of a pneumothorax safer and easier; it yields definite indications of the presence of adhesions and gives reliable information as to where the needle point is situated. While it is not absolutely necessary, it is often a good procedure to give a nervous patient a hypodermic of morphine and atropine about half an hour before the initial filling. He believes that the initial filling is best done with the patient at rest in his home or in a hospital, and, if one is not successful at

the first trial, one more attempt should be sufficient at the first procedure. He believes that one should be as careful in his technique as in performing a major operation.

The patient is placed on the side opposite to that which is to be injected, with a pillow beneath to effect a greater separation of the ribs, which is aided by the elevation of the arm on the side affected. The area selected for the operation is painted with tincture of iodine. A sterile sheet with a small opening is placed over the patient. The parts are then anesthetized with a one-half- to one-per-cent solution of novocaine, being careful to anesthetize the skin first by injecting the solution intradermally, then introducing the needle slowly, carefully injecting the solution ahead of the point of the needle. One can usually tell when the pleura is reached, especially when it is thickened. During the refills, one can tell when the free pleural space is reached by withdrawing the piston and noticing the bubbles of air enter the syringe. The skin is now punctured with a small sharp-pointed knife to facilitate introduction of the pneumothorax needle.

The apparatus is tested to see if it is in perfect working order. Kalb has purchased and tried out all the different needles recommended. These are usually complicated with valves and cannulæ, making them cumbersome to handle and difficult to keep in good working order on account of rust. He finally settled on the Salomon catheter for initial fillings, and a plain platinum needle for refills. The manometer is connected with the catheter or needle, which is then introduced through the anesthetized area. As soon as the pleural cavity is reached, the manometer will fluctuate with the respiratory movements. In the initial operation the cannula is pushed through the chest wall, the retraction of the lung preventing puncture of the visceral pleura. If there is a free pleural space, the negative pressure causes an inrush of air through the cannula, which is distinctly heard. The catheter is at once introduced, and reading taken.

One must have a negative pressure with a manometer oscillation of at least two centimeters to be sure he is in the pleural space. If the lung has been entered, the manometer moves equally above and below the zero point. Having entered a free pleural space the air is now turned on, and after the introduction of one hundred cubic centimeters a reading is again taken. If there are no adhesions the reading will be altered very little with this amount, but if there are adhesions forming only a small pocket, one or two hundred centimeters will make a positive pressure.

Formerly it was the custom to introduce large amounts of gas at the first filling, but the majority of operators are agreed that two to four hundred centimeters are sufficient. The second filling is made from two to three days following, and the interval between the fillings is gradually lengthened until a complete collapse is established and the pleura adapts itself to the presence of the air. In the refills he ordinarily gives from three to five hundred centimeters, depending upon the interval and the rate of absorption, as he thinks it is better not to allow the lung to reëxpand too much.

As to complications, emphysema may occur, especially when a large needle is used or when considerable pressure is made in order to overcome adhesions. This can be avoided by applying a pad and a tight strap over the site of puncture. Cases are on record in which general emphysema was caused by puncture of the lung.

Some authorities claim that air embolism and pleural shock are synonymous, but from his experience he believes that they are separate conditions, for there are cases of dyspnea, anxiety and pain which are not caused by air embolism. In the latter there are convulsive movements, loss of consciousness, which may be followed by paralysis and even death. Giese, of

Colorado Springs, reports two fatal cases, and Homan and Smith, of El Paso, two resulting in death. He has had two cases, one unconscious for several hours, with complete and prompt recovery on regaining consciousness; the other with similar symptoms followed by right-sided hemiplegia, which gradually disappeared, but only at the end of a month was recovery complete. Typical symptoms of pleural shock have been experienced in five of his cases.

Some authorities, among them Peters of Albuquerque, claim that if compression is kept up long enough 100 per cent will develop effusion. This complication occurred in eleven of his cases, and he thinks that possibly the small needle used is a factor in such a small percentage. Of these eleven cases the fluid in six became purulent, being loaded with tubercle bacilli. These were all relieved by the formaldehyde-glycerin treatment, according to Murphy.

The Internal Use of Liquid Paraffin.

In its "Correspondence Columns" the *British Medical Journal* of December 30, 1922, publishes the following communication from Montague Dixon on this subject:

"For a considerable time I have been warning my patients against taking paraffin internally for constipation, as I felt that it might be leading to the development of cancer. I formed this opinion on two grounds: (1) the production of cancer by soot and hydrocarbons, and (2) the fact that the taking of a mineral substance was such a profound departure from the normal, a device of, one may say, supercivilization; and as our civilization expands, and we depart farther from natural living, we seem to suffer more from this dread scourge of our race.

"The articles published in your issues of November 18 and December 9 confirm my forebodings. The occupational cancer seems to need ten years of the irritation of the paraffin ere it develops. We are now at more than that interval of time since this treatment of constipation was started; shall we soon see cases showing themselves?

"I use as a substitute agar-agar. This can be purchased quite cheaply, in the form of sticks, and cut up with scissors and stored in a tin. A tablespoonful once or twice a day has an excellent effect."

Vomiting Induced by Tartar Emetic.

In the *Journal of Experimental Medicine* for January, 1923, WEISS and HATCHER state that it has been shown that tartar emetic acts on the stomach to induce emesis after its oral administration, that only traces are present in the vomitus following its intravenous injection, and that it does not induce emesis when it is applied directly to the vomiting center.

In the present study, which was made with cats except when otherwise specifically stated, the intravenous injection of tartar emetic caused emesis (typical vomiting movements) after the removal of the entire gastrointestinal tract from the esophagus to the anus.

Cutting the vagi inhibits emesis after the intravenous injection of any dose of tartar emetic, though nausea may be induced.

Cutting the vagi and simultaneously extirpating the stellate ganglia inhibits both nausea and vomiting after the intravenous injection of tartar emetic.

Extirpation of the celiac ganglion and simultaneous cutting of the vagi just below the level of the diaphragm does not prevent emesis following the intravenous injection of tartar emetic.

Cutting the vagi prevents vomiting after the introduction of large doses of tartar emetic into the stomach, but massive doses may still cause emesis. Vagotomy probably has less influence on the emetic action of a moderately large dose of tartar emetic introduced into a loop of the duodenum.

Atropine has very nearly the same effect on the emetic action of tartar emetic as cutting the vagi, but much larger doses are

necessary to abolish the effect of the introduction of tartar emetic into the stomach in moderate amounts than that of equal amounts injected intravenously.

The facts just stated point to the heart as the seat of reflex vomiting following the intravenous injection of tartar emetic.

The intravenous injection of tartar emetic induces afferent emetic impulses which pass from the heart to the vomiting center mainly by way of the vagus, to a much less extent by way of the sympathetic nerve and the stellate ganglia.

The introduction of tartar emetic into the stomach induces afferent emetic impulses which pass upward mainly by way of the vagus, to a much less extent by way of the sympathetic nerve.

The introduction of tartar emetic into the duodenum induces afferent emetic impulses which pass upward partly by way of the sympathetic nerve, partly by way of the vagus.

It seems probable that the path taken by afferent emetic impulses induced in the gastrointestinal tract by tartar emetic depends on the innervation of the organ concerned, and not on any selective action of the poison on the afferent nerve.

The Effect of Quinidine Sulphate on the Ambulatory Case of Auricular Fibrillation.

FARNUM, in the *New York State Journal of Medicine* for January, 1923, states that of twenty-two ambulatory cases of auricular fibrillation only three responded to quinidine sulphate with normal auricular ventricular sequence. Of these three, one remained regular for only a few days. The others are still regular, the quinidine sulphate having been given about six weeks ago.

In the three cases which became regular, the compensation was not bettered to the extent hoped for or reported by other investigators.

The cases with unstable cardiac mechanism with rapid rate, pulse deficit, and little cardiac reserve derived no benefit from the administration of quinidine sulphate. They were in some instances made worse. All were glad to return to digitalis, and soon regained their former compensation under that drug.

In the ambulatory fibrillator with fair compensation, quinidine sulphate may be expected to reëstablish a normal rhythm in a small percentage of cases; but even with this return the compensation is not materially bettered, and we have to fall back on the more efficient and safer therapy of digitalis.

Quinidine in Heart Disease.

The *Lancet* of December 16, 1922, in its "Annotations," states that the use of quinidine in the treatment of auricular fibrillation and allied conditions has recently attracted much attention. The number of recorded observations is now considerable, and to it Parkinson and Nicholl have added a new series of 35 cases which appears in the same issue of the *Lancet*. Quinidine differs from digitalis in its action on auricular fibrillation in that it attacks the condition at its source.

The work of Lewis and his colleagues lends strong support to the hypothesis previously enunciated by Mines that auricular fibrillation and flutter are due to a peculiar disorder of the cardiac mechanism known as "circus movement," in which the discrete impulses emanating from the normal pacemaker of the heart are replaced by an excitation wave which is continually circulating in the auricle. Such a wave will be brought to a standstill if in the course of its journey it encounters muscular tissue which is still inexcitable owing to the passage of a previous stimulus. Further, Lewis has shown that one of the actions of quinidine on the heart muscle is to prolong the refractory period and so to hold up the circulating wave and to bring the abnormal mechanism to an end.

That this favorable result may be antici-

pated in over 50 per cent of the cases of auricular fibrillation treated with quinidine is seen from the figures of various workers on the subject. The time, however, which has elapsed since these statistics appeared is not yet sufficient to enable us to foretell the percentage of cases in which a permanent cure may be anticipated; but from the figures of Parkinson and Nicholl, as well as those given by Hay in his paper at the November meeting of the Liverpool Medical Institution, it would appear that a considerable number of the successful cases are doomed to relapse into fibrillation. Opinion is divided as to what measures should be adopted to prevent relapse. Some observers consider that the administration of quinidine in small doses should be continued after normal rhythm has returned, while others are of opinion that such continuance is not likely to prove beneficial. Again, from a therapeutic aspect, we hesitate to reckon all those patients who do "turn over" as successful cases. For although some show truly spectacular improvement in their general condition, others appear to have derived but little benefit from a reversion to normal rhythm.

On the other side of the scale we must weigh up the results of digitalis treatment. According to modern conceptions the rôle of the auricular muscle in helping to maintain the circulation is one of very minor importance, and the symptoms of heart failure, so frequently seen in association with auricular fibrillation, are attributable not to inefficiency of the auricle as a pumping mechanism, but to the excessive rate of the ventricle. If this ventricular tachycardia be abolished, as it can be in the majority of cases by the use of digitalis, the symptoms of heart failure, in so far as they are due to the abnormal rhythm, will disappear. It is, therefore, important to decide in each individual case whether it would be better to incur a slight possible risk in attempting to restore the normal rhythm by means of quinidine, or to be satisfied with controlling the ventricular rate by means of digitalis. Occasionally the exhibition of quinidine is actually detrimental, since the reappearance of auricular activity in old-standing cases of heart failure is liable to lead to embolism. Again, in some cases, the treatment has to be abandoned on account of an excessive rise in the ventricular rate. This may often be prevented by administration of digitalis in conjunction with quinidine, although this practice is not universally approved. In other cases toxic manifestations make their appearance before it is possible to give the drug in quantities sufficient to obtain the desired result. But even if these drawbacks be taken into consideration, most cardiologists will agree with Parkinson and Nicholl that in suitably selected cases of auricular fibrillation—and such cases constitute the rule rather than the exception—quinidine at any rate deserves a trial, not as an alternative, but as an addition to digitalis therapy. On *a priori* grounds we should look for the highest percentage of successes among those cases in which fibrillation is of recent onset, but Parkinson and Nicholl state that in their experience this is not necessarily the case.

With regard to the use of quinidine in conditions other than auricular fibrillation, the number of recorded cases of flutter in which the remedy has been employed is still too small to warrant any definite statement, although here one might expect an even higher percentage of successful results, since the mechanism of flutter appears to be intermediate between that of fibrillation and normal rhythm, and electrocardiographic records show that a considerable number of cases of fibrillation treated with quinidine pass through a stage of pure flutter before reverting to normal rhythm. In paroxysmal tachycardia (excluding paroxysmal fibrillation) the results obtained have not been satisfactory, and do not appear to warrant the use of quinidine in that condition.

A word of caution is still necessary with regard to the use of this drug. It has

already been definitely proved to be not merely of scientific interest, but of undoubted therapeutic value in properly selected cases; but in the present state of our knowledge its administration is not without danger, and its action requires to be closely observed and carefully controlled.

[The existence of auricular fibrillation does not indicate either quinidine or digitalis unless rupture of compensation is threatening or present.—Ed.]

The Present Status of Radiation Treatment of the Tonsils.

Robinson, in the *New York Medical Journal and Medical Record* of January 3, 1923, states that there is a feeling among many physicians that, because the region of the neck contains so many important anatomical structures, radiation treatment may do harm. This feeling is not shared by radiologists because of their daily use of much heavier doses used in treating malignant conditions of the throat and neck. Boggs writes: "Literature fails to reveal the report of any case of untoward effects of radiation on the thyroid, parathyroid, pituitary or parotid gland."

One thousand milligramme hours of radium is an ordinary dose given for metastatic glands in the neck, and an *x*-ray dose of 5 ma., spark-gap nine inches, filter 3 mm. aluminum, with a distance of ten inches for six to seven minutes, is regularly given if radium is not at hand. Thus a much smaller dose given in treating the diseased tonsil surely cannot do harm to adjacent tissues. Bergonie and Tribondeau's law is that "immature cells and cells in an active state of division are more sensitive to radiation than are cells which have already acquired their fixed adult morphological or physiological characters." If we accept the above law or the teachings of Dominici that elementary cells are receptive or sensitive to hard rays and the well-known selective action of radium, then fear of radiation treatment of tonsils must be laid aside.

Turning from the safety of this treatment to the effect of radiation upon bacteria, we find that Murphy reports forty-six patients with tonsils both hypertrophied and otherwise pathologically altered, and some of whom had in addition adenoid masses and lymphoid deposits posterior to the pillars of the fauces which were given treatment. In all but four cases the treatment was followed by marked atrophy by opening up and drainage of the tonsillar crypts. As this process progressed the previously enlarged tonsils assumed a smooth and normal appearance, and hemolytic bacteria—streptococci and staphylococci chiefly—which were often present in the affected tonsil, disappeared usually within four weeks of treatment.

Probably the bactericidal action of radiation is derived from the secondary beta rays and the alpha rays—chiefly from the beta rays, which are produced in the tissues during the passage of the gamma and *x*-rays. McKee says that these rays are able to interfere markedly with cultures even to the point of complete destruction. However, this subject has few references to carefully controlled experiments and presents a fertile field for much discussion.

He has seen a neuritis of long standing clear up in four weeks after radium treatment of a diseased tonsil. He has also seen cases of acute and chronic rheumatism become free of this disease after atrophy of the tonsil by radiation. At present he is introducing a solution of iron into areas to be treated by radiation with the hope of increasing the production of secondary beta rays. He has noticed that an acutely infected tonsil reacts much better than the chronic, possibly because of the presence of more blood with its iron content in the tonsil, the iron increasing secondary beta radiation.

Radium seems to him to be the method of choice because only one application is usually needed. It may be augmented with an *x*-ray treatment externally. Ewing says that "Radium can be relied upon to do the same thing under the same circumstances." The *x*-ray is not quite as reliable, but, with

the advent of the Coolidge tube, technique may be carried through with a smaller chance of error than formerly. Children are afraid of the noise of the *x*-ray, but he finds that they rather enjoy the external radium treatment because of the novelty of having their heads bandaged up.

The manner of application of radium differs with different men, but the object is always the same and results similar. He still thinks that the introduction of the radium needle directly into the tonsil with supplementary *x*-ray treatment to the neck is the method of choice because it affords an ideal application of the agent.

The Drug Treatment of Syphilis of the Nervous System.

MOTT, in the *Lancet* of January 6, 1923, states that the diagnosis of the nature of the syphilitic lesion having been made, it is necessary to decide upon the mode of treatment. It is better not to have a fixed scheme, but to be guided by general principles dependent upon the age, health, sex, and weight of the patient, together with the character and intensity of the syphilitic affection and history of previous treatment for syphilis or other diseases. He emphasizes the importance of an examination of the cerebrospinal fluid both in diagnosis of preclinical affections of the nervous system as well as for affording an indication of progress and success of treatment.

The modern treatment by salvarsan requires a thorough clinical examination. The older a patient is, the greater should be the care in the dosage, method, and frequency of administration. Disease of the lungs, of the heart, or the arteries, and especially of the kidneys, calls for special attention and care. It must be borne in mind that in a fair proportion of cases of disease of the nervous system a combination of diseases of these organs occurs. Arteriosclerosis and other degenerative conditions should make one especially cautious in persons of advanced age; those whose constitutions are broken down by chronic alcoholism or disease also require great care. The urine should always be carefully examined. A trace of albumin with no casts, or with only a few hyaline casts, may exist in syphilitic patients, or the presence of albumin may indicate an idiosyncrasy. Seeing that in fatal cases following salvarsan injection the kidneys have been found to contain the most arsenic of all the organs of the body, it follows that even a trace of albumin should make one cautious in the administration of either mercury or salvarsan.

The urine should be tested twice a week during treatment, and any indication of albumin present prior to treatment, and the appearance of granular casts, should be a danger-signal either to beginning or continuing arsenobenzol treatment. Probably small doses of neosalvarsan are less dangerous than mercury injections in syphilitic albuminuria.

In the matter of the selection of mode of treatment, it is very necessary to discriminate between active inflammatory processes due to active spirochetal infection causing a generalized gummatous meningitis or localized gummatous tumors, and necrotic softening due to thrombosis of vessels caused by a preëxisting endarteritis in which there is no evidence of active development of the specific organisms. He has in mind cases which gave a negative Bordet-Wassermann reaction, and yet by treatment were relieved of symptoms. Of course, the two conditions may occur simultaneously at all periods of time following infection, although the combined conditions on the one hand are especially liable to ensue in untreated or inefficiently treated cases occurring in the first few years after infection; the necrotic softening, on the other hand, occurs more often in the later tertiary stages where there may be no clinical evidence of active spirochetosis. The clinical symptoms, pointing to irritation phenomena, should be recognized before any arterial thrombosis

and necrotic softening occur, or, if the signs and symptoms point to necrotic softening with paralytic phenomena, we should make certain whether there is any active inflammatory process occurring simultaneously.

Before the introduction of salvarsan great success was obtained in such cases by immediate and energetic mercurial treatment, either by injections or inunctions, and it is well not to forget that mercury is still of the greatest value in treatment.

Having decided that the patient is fit for a particular course of treatment, it is necessary to decide how and by what channel the treatment is to be administered. The introduction of the arsenobenzol treatment does not imply that it is necessary to discard old and well-recognized methods of treatment such as mercurial inunction and injection, or the use of iodide of potassium. In cerebrospinal syphilis he has seen the most satisfactory results obtained by such methods of treatment before the introduction of salvarsan. In making a choice the physician will be influenced in his decision by various circumstances—*e.g.*, the chronicity of the symptoms, the result of examination of the blood and cerebrospinal fluid, the advisability of consulting the patient's interests and feelings, particularly in the matter of prescribing mercurial inunctions for a married man, and also the likelihood of the patient carrying out satisfactorily such a mode of treatment.

The modern intensive mode of treatment which is usually adopted for syphilis of the nervous system is as follows: A dose of 0.15 to 0.3 g. of neosalvarsan is given either intramuscularly or intravenously to test the individual's tolerance to the drug. This is repeated in a few days' time, and, provided no signs of intolerance are shown, a week later a full dose of 0.6 to 0.9 g. is given and repeated each week for from six to eight weeks. The weekly dosage may be regulated by the condition of the patient, and the evidence of tolerance or intolerance shown by the reactive phenomena. Plaut recommends an initial ten days' course of mercurial inunction, and a series of grey oil injections at three-day intervals (five injections of 0.2 to 0.5 g.). The urine should be tested for albumin each week, and other symptoms of intolerance of the drug or evidence of chronic intoxication should be carefully looked out for. An examination of the cerebrospinal fluid and blood should be made at the end of the course of treatment, and the four reactions compared with those obtained prior to the beginning of treatment.

Some authorities are content with the employment of arsenobenzol alone; others give weekly mercurial intramuscular injections of 0.03 to 0.05 cc of mercury, grey oil, or calomel cream, or a course of mercurial inunction consisting of 30 to 40 rubbings of unguentum cinereum, one drachm (4 g.), may be employed. Mercury in the form of Hutchinson's pill, 1 gr. (60 mg.) of grey powder and 1 gr. (60 mg.) of pulv. ipecac. comp., three times a day, may be used in some cases. Between the courses of treatment eight weeks are usually allowed to intervene. Iodide of potassium in 10- to 15-gr. doses or even more three times a day may be given in the interval according to tolerance of the drug, combined with ½ to 1 dr. doses of tincture of cinchona.

At the International Congress of Neurologists, held in Paris in 1920, Sicard pointed out that in certain cases grave symptoms and occasionally fatal results may arise in the course of, or consecutive to, the employment of arsenobenzol compounds. These are directly or indirectly due to its administration. They are as follows: (1) Idiosyncrasy—*i.e.*, individual susceptibility to arsenic which may occur in a syphilitic or non-syphilitic subject directly, or some minutes after the intravenous injection, or even one or two hours after. The patient is seized with anguish, general malaise, and vasomotor disturbances, which especially affect the face. These last from some seconds to a few

minutes. Sometimes the attack is accompanied by a general trembling, nausea, and rise of temperature; this is the nitritoid crisis of Milian. Another sign of predisposition to arsenical intolerance is the appearance of erythematous rashes after the first dose. (2) The neuro-recidive or Herxheimer reaction. He pointed out that mercury does not produce this reaction, and that its administration prior to the administration of salvarsan prevents the appearance of this reaction. (3) Anaphylaxis. The reactions of an anaphylactic character are often serious. They may be fatal, and they are characterized by convulsive movements, pulmonary edema, and coma. Anaphylactic shock occasionally occurs on the next day, or the day after the second or third weekly injection.

Sicard states that in 200 to 300 cases of neural syphilis, treated exclusively by small repeated doses of neosalvarsan, he has not had a single case of anaphylactic shock. The preparations he uses are novarsenobenzol, galyl, and sulfarsenol, in doses of from 0.15 to 0.2 g. They can be used intravenously, or by dissolving in an oily medium or aqueous glucose; they can be used subcutaneously or intramuscularly. In this way he obtains a total dosage of 8 g. of the medicament. He states that only once has he noticed an abscess result, and that intramuscular injection is nearly painless. Following Sicard, he has employed intramuscular injections of novarsenobenzol in aqueous glucose in similar small repeated doses, and this treatment has been very successful and painless. This "driblet" method has also been advocated by Harrison, who states as follows: "The subcutaneous injection has the further advantage that it can be given without reference to a meal."

Sicard claims that in chronic syphilitic diseases of the nervous system the results are superior to those obtained by weekly intravenous injection, and the Bordet-Wassermann reaction of the blood and cerebrospinal fluid shows a better result by repeated small doses every two days for a period of two months than by the weekly injection. He does not believe that small doses produce an arseno-resistance, as experiments seem to indicate. Harrison states that sulfarsenol has the great merit of causing little pain when given subcutaneously or intramuscularly. He also states that he has found that silver salvarsan appears to be twice as strong as sulfarsenol, and he has found it very useful in tabes and other syphilitic diseases of the nervous system. He also relates the history of a case of general paresis. While admitting that remissions occur spontaneously in this disease, he considers that although this case is incomplete it has "proceeded far enough to show that colossal doses of silver salvarsan do affect adversely the deeply-buried spironemes."

A slow progressive intoxication by the arsenic, whether given intravenously, weekly, or by repeated small doses every other day, may be manifested by the following signs: (1) Erythematous rashes are symptoms of the terminal phase of the treatment and indicate an interruption of further injections for at least eight to ten weeks; they also point to caution being exercised in further administration. Some authorities have noticed that certain tubes of novarsenobenzol have appeared to be more productive of an erythematous dermatitis than others. (2) An early indication of the toxic action of the arsenic on the peripheral nerves is the disappearance of the Achilles tendon jerk, although there is no paresis or necessarily any subjective sensory disturbances. (3) Jaundice, which usually clears up in from three to four weeks. In pushing the treatment these signs of toxic effects should be carefully looked for.

The careful practitioner, knowing of these early complications and late intoxications, will prudently apply the knowledge of their causation to their prevention and thus avoid risks as far as possible. Harrison, in a recent valuable article on the Modern Treatment of Syphilis, states: "Jaundice and dermatitis have certain fea-

tures in common. Both are apt to be fatal, and both may appear long after a course of injections has been given." Considering the immense number of cases which have been treated successfully by the intensive method, we should not be deterred from using this valuable intensive mode of treatment of neurosyphilis by the fact of occasional accidents.

In 1911, working independently, Swift and Ellis, Marinesco, Fisher, and George Robertson introduced the method of treatment of syphilis of the nervous system by intrathecal injection of serum salvarsanized *in vivo*. The general consensus of opinion is that spinal intrathecal injections of salvarsanized serum or hypotonic solution of neosalvarsan are still on trial, and it is not yet proved that they possess advantages over the intravenous or intramuscular methods of treatment. Another method is to give intravenous or intramuscular injections of arsenobenzol or silver salvarsan, followed by lumbar puncture and withdrawal of cerebrospinal fluid. The intracranial injections in the treatment of general paralysis have been for the most part given up. He has made autopsies in a number of cases so treated, and has found active spirochetosis.

We have yet to learn whether salvarsan treatment will reduce the number of cases of tabes and general paralysis; there is a feeling on the part of a good many neurologists that the modern treatment by arsenobenzol compound presents no very great advantage in the treatment of neurosyphilis over that obtained by the systematic treatment by mercurial inunction and intramuscular injections of mercury combined with iodide of potassium. This, however, may be due to the fact that when the new treatment was introduced many patients thought that a few intravenous injections of salvarsan would be sufficient to complete a cure, and Harrison, from a long experience, has uttered a note of warning that "unless a patient is willing to persevere until he has received a substantial amount of the arsenical remedy, it is better to withhold the latter—this applies especially to tabes."

It is well to note that even after prolonged and intensive treatment the blood may give a positive Bordet-Wassermann reaction, but if the patient's fluid shows a positive reaction as well as the blood a constant menace remains, although the patient may exhibit no clinical symptoms. The positive reaction of the blood is not nearly of so great importance, for he has found a large number of people of all ages giving a positive reaction of the blood, and yet exhibiting no signs indicative of syphilitic disease, or at any rate of disease which would bring them to the doctor for treatment. It is well to mention this fact, for the general public are aware of the significance of this blood reaction, and he has seen many cases of syphilophobia in consequence of an exaggerated view of its importance.

Contraindications and Results in Surgical Removal of Tonsils and Adenoids Compared with X-ray Therapy.

In the *American Journal of Electrotherapeutics and Radiology* for December, 1922, WITHERBEE states that the most common of the earlier complications which contraindicate operation is the possibility of hemorrhage. This may be due to atheroma of the arteries and to any condition that definitely retards the coagulation of the blood. Middle-ear disease and mastoid involvement may also follow the operative procedure. Especially is this true if the operation is performed during an attack of tonsillitis or of peritonsillar abscess.

The introduction into the circulation of septic emboli and aspiration of infected material during the removal may cause abscess of the lung, acute endocarditis, empyema, pneumonia, subdiaphragmatic abscess, phlebitis, etc.

Recently, Fischer and Cohen recommended local anesthesia to obviate the

above complications, claiming that this removed the possibility of aspirating infective material and by producing constriction of the lymph and blood channels in the field of operation prevented the introduction into the circulation of the infective emboli.

Clendening, in referring to the above article, insists that the single lung abscess is due to aspiration, and not due to infective emboli, whereas the multiple lung abscesses are due to the introduction of septic emboli, and cites a case in which a tonsillectomy was done under local anesthesia in a doctor's office, a few days later developing abscess of the cervical nodes, multiple lung abscess, double empyema, and femoral phlebitis.

Without attempting to solve the question as to the cause of the single and multiple lung abscess and the other complications before mentioned, it might be well to suggest that the remedies employed to protect the patient from these dire results have up to the present time been quite inefficient, as evidenced by the reports of cases in the literature and the number of cases presented during the many discussions of this subject that never find their way into the literature.

The technique of dissecting out the small fibroid tonsil necessitates cutting or tearing through the chronically infected tissue in which it is embedded, thereby opening up the lymph and blood channels and freeing septic emboli from this tissue which are introduced into the blood stream. For the surgeon to deliberately cut through chronically infected tissue, instead of cutting wide of the diseased area, is considered, to say the least, poor technique and unjustly jeopardizes the patient's chances of a complete recovery. It therefore follows that in a large proportion of cases, especially in adults, the operation from a surgical standpoint is contraindicated owing to the necessity of disregarding the fundamental principle of cutting wide of the diseased area. The surgical removal of tonsils and adenoids in the cases of focal infection invariably leaves the infected lymph tissue on the lateral and posterior walls of the pharynx.

The objections encountered in the use of *x*-ray therapy in cases of chronically infected lymph tissue of the nasopharynx are as follows:

1. *X*-ray burns. The dose given in these cases is less than one-fourth of the exposure that would produce the first signs of an erythema.

2. Effects of parotid, submaxillary, pituitary, and thyroid glands. If the technique is properly followed none of these glands will be directly exposed to the ray.

3. Dryness of the throat and mouth. This is only produced when the salivary glands are exposed through an error in technique or too large doses given.

4. Concealed tonsillar abscess. In two of his cases out of six hundred this condition was revealed after shrinkage of the tonsil. These abscesses are walled off by fibrous tissue and thus rendered sterile.

The absorption of the lymph tissue in the tonsil, adenoid, and lymph tissue of the nasopharynx not only drains the infected crypts, but also leaves only the fibrous and connective tissue which nature utilizes in her defense in all local infections.

From past experience in acne, carbuncle, erysipelas, diphtheria carriers, etc., it is evident that the *x*-ray produces a local immunity in the tissues preventing any further activity of the pathological process, but in no way directly affecting the invading bacteria.

Finally, the contraindications to operation in no way interfere with the *x*-ray method of treatment, and it is especially indicated in cases associated with rheumatism, diabetes, hemophilia, chronic endocarditis, or any other condition in which an anesthetic is contraindicated. The final results of *x*-ray treatment can only be determined in any given case after eight exposures have been made at two-week intervals and two months have elapsed after the eighth treatment.

A Note on Adrenalin Therapy.

WORCESTER and O'HARA, in the *Boston Medical and Surgical Journal* of January 18, 1923, state that their communication has two purposes: (1) To report a therapeutic use of adrenalin which is new to them. (2) To speculate as to the mechanism of its action in this particular case.

The complete history of this case would involve pages of specialists' and laboratory reports, accounts of operations for the removal of focal infections, etc., and would not be pertinent to the discussion. It will suffice to state the clinical and anatomical diagnoses, and to recite the symptoms at the time of beginning and during the use of adrenalin.

H. W. L., male, sixty years old. Clinical diagnoses: Cirrhosis of the liver, bronchiectasis, asthmatic bronchitis, Walker (?), carcinoma of the stomach, bronchopneumonia and left acute pleurisy (terminal).

Anatomical diagnoses: Cirrhosis of the liver, bronchiectasis, fibrinous pleurisy (left), adhesive pleurisy (left and right), bronchopneumonia (bilateral), slight ascites, slight passive congestion of spleen, and moderate arteriosclerosis.

The use of adrenalin first began one year and five days previous to death. At this time the above clinical diagnoses were made except for the terminal pulmonary conditions. Because the illness had already existed for more than three years, the carcinoma diagnosis was in considerable doubt, and the morphine which had previously been used because of this diagnosis was being withdrawn. This withdrawal of morphine accentuated the symptoms of which the patient complained. These complaints were of asthma, and of the sensation of a "lump" in the epigastrium. The patient had been previously tested out for sensitivity to the various food and pollen proteins, and had been placed on a diet. But adherence to this diet gave no relief from the asthma and had the detrimental effect of producing loss of weight. Although the asthma was not especially severe, it was decided, nevertheless, to give some relief if possible with adrenalin.

Parke, Davis & Co.'s 1:1000 solution was used, in a subcutaneous dose of one cc. The effect of the adrenalin on the asthma was satisfactory, but it was at once noticed by the patient that the "lump" in his stomach had disappeared. The use of adrenalin was therefore continued, in part to relieve the asthma, but mainly for the relief of epigastric distress. Between September 10, 1921, the day the adrenalin treatment was begun, and September 15, 1922, the day of death, the patient received over three liters of adrenalin solution, given subcutaneously at average intervals of four hours, day and night. Only once did it fail to relieve the "lump" in the epigastrium. This was one week before death when the patient was suffering with acute pleurisy. Subsequently it again afforded satisfactory relief, and its action was favorably commented on by the patient ten hours before his death.

The pathology of this epigastric distress has not been clear to them. It was more marked after eating, but had no relation to the character of the food ingested. They believe that it was due to one or both of the following conditions: First, gaseous distention of the stomach with cardiac spasm; but they were unable to percuss out the stomach with any degree of success because of the enlarged overlying liver. Second, an enlargement of the liver with resulting tension of its capsule. This hepatic enlargement had been increasingly evident for two years. It would be expected that both of these conditions would be aggravated by the changes known to occur in the physiology of digestion.

The pharmacology of adrenalin would support both of these hypotheses. First, the injection of adrenalin is followed by immediate cessation of the movements of the stomach and intestine, which become relaxed to their full extent. This would explain the mechanism on the basis of increased intragastric pressure being the cause of his distress. Second, the action of adrenalin on the blood-vessels, which would explain the mechanism on the basis of engorgement of the liver and consequent

tension of its capsule, is as follows: The greatest constriction is seen in the vessels of the splanchnic area, the other vessels being involved in less degree. The pulmonary arterioles are so slightly constricted that there has been some difficulty in proving that they are involved in the general action. This being so, adrenalin would mechanically decrease the amount of blood entering the portal circulation, and would increase the amount of blood passing into the lungs, thus facilitating portal drainage.

In addition to these mechanisms, the relief of whatever asthma may have been present was probably a contributing factor, by allowing more free diaphragmatic movement. In this connection it is noteworthy that on many occasions asthma was not a complication evident to either this patient or his attendants.

The patient was fortunate, as were also his physicians, in that he had a very good myocardium, for although the action of adrenalin on the heart and coronary circulation is not constant, it is doubtful whether those hearts which are frequently the cause of gastric and hepatic distention could cope with the use of such large amounts of the drug over such a long period of time. However, it is felt that the theory here set forth is sufficiently sound to warrant its trial in cases of this class. They could not and would not have stopped its use in this case, regardless of myocardial conditions. For a year it enabled the patient to meet and enjoy his friends. A morphine addict was never more dependent on his dope, nor more anxious when his stock of it on hand was low, than was this man's dependence upon adrenalin to relieve his suffering.

Aside from the main purposes of this paper, there should perhaps be noted the effect of this large amount of adrenalin on the blood-pressure. For two years before death the blood-pressure was taken on an average of at least once a week. Previous to the use of adrenalin it was never above 116, and averaged 110. After commencing the use of adrenalin it averaged 130, was never above 142, but dropped off slightly in the last few months, although the amount of the drug used was not restricted. The pulse pressure never showed significant variation, being usually about one-quarter of the systolic pressure.

They summarize their article as follows:

The beneficial action of adrenalin on epigastric distress, presumably due to intragastric pressure, or liver engorgement, or both, has been observed in one case, repeatedly and over long periods of time.

This beneficial action was a happy therapeutic accident, which in the daily life of this particular patient was dramatic in its certainty and promptness.

On the theoretical basis set forth, this effect of adrenalin has a correct pharmacological foundation.

The use of adrenalin for cases of similar pathology is suggested.

Should Treatment for Ulcers of the Stomach and Duodenum be Medical or Surgical?

In an editorial on this subject, the *Lancet* of January 20, 1923, states that before this question can be answered satisfactorily, reliable answers to a number of other questions are required. Indeed, the whole subject bristles with question marks, which emphasize our lack of reliable data. At present we cannot even approximately estimate the chances of fatal complications when no operation is performed, nor can we say how often, and in which cases, skilled medical treatment effects a permanent recovery. How frequently, and to what extent, are the patient's health and working capacity reduced by ulcer symptoms, and what are the end results of surgical treatment? The three complications which, more than any other, have swept cases of gastric and duodenal ulcer out of the hands of the physician into those of the surgeon are malignant degeneration, fatal hemorrhage, and perforation.

A few months ago Nielsen, of Copenhagen, showed in a masterly review of the subject that the chances of malignant degeneration of gastric and duodenal ulcers have been much exaggerated, and his researches suggest that, though malignant disease of the stomach and duodenum often masquerades for a time as simple ulcer, it is comparatively seldom the final stage of chronic ulceration. In a more recent publication he has dealt with the chances of ulceration of the stomach and duodenum terminating in fatal hemorrhage, and the prospects of aborting this issue by operative interference. As his analysis of the large material at his disposal at the Rigshospital in Copenhagen indicates, fatal hemorrhage is not only comparatively rare, but it also shows a remarkable tendency to attack persons who have previously shown slight or negligible symptoms. And if there had been slight symptoms beforehand, they had lasted only a short period. Obviously in these cases, even the discussion of an operation as a prophylactic measure against fatal hemorrhage is unthinkable, considering how common are slight and transitory digestive disturbances.

Nielsen has collected 55 cases of fatal hemorrhage, observed between 1907 and 1917 in Copenhagen, and the post-mortem records showed that in 16 cases the fatal hemorrhage came from a recent ulcer or erosion, and in 11 other cases the source of the hemorrhage was also a recent ulcer, although other old ulcers were also found. In seven cases the post-mortem records were incomplete, and only in 21 cases did the fatal hemorrhage come from a chronic ulcer. Most of the 27 patients who died of hemorrhage from a recent ulcer were elderly; the age of 20 of the patients was between forty and seventy-six. The quasi-paradoxical conclusion to which Nielsen comes is that though only about a quarter of all the ulcers of the stomach and duodenum develop after the fortieth year, yet about three-quarters of all the fatal hemorrhages from recent ulcers occur in patients who have passed the fortieth year. No doubt the capacity of a bleeding artery in this region to contract diminishes with age, and this is Dr. Nielsen's solution to his paradox. He has traced 182 patients, discharged from hospital two and a half to nineteen years earlier, the diagnosis of gastric or duodenal ulcer during their residence in hospital being of a searching and reliable character. The treatment given in hospital was strictly medical. His investigations showed that 42 had subsequently been operated on, but in no case was the operation for severe hemorrhage or free perforation. Of the remaining 140 patients, 16 were found to have died, but only in two cases was death due to hemorrhage, and in none was it due to free perforation. Hence Nielsen's conclusion that the surgeon is hardly justified in recommending operative treatment to patients suffering from gastric and duodenal ulcer merely on the ground that they may possibly die of hemorrhage.

An Aseptic Local Anesthesia as Applied to the Anal Region.

MARTIN, in the *New York Medical Journal and Medical Record* of January 17, 1923, states that following a preliminary hypodermic injection of one-sixth grain morphine and one two-hundredth grain hyoscine hydrobromide, given one hour prior to operation, and repeated at the half-hour, the patient assumes a right lateral prone position with the knees flexed and the body rotated sufficiently for convenient exposure of the anal field. Following any approved cleansing preparation, an area about one and a half inches posterior to the anus is freshly iodized by the operator himself, and nothing is allowed to touch this spot until the anesthesia is complete, except the sterile two-and-a-half-inch, twenty-gauge standard hypodermic needle. This needle, attached to any type of syringe, one-, two-, or three-ounce capacity, is plunged through the sterile iodized area where the injection is commenced and continued, pushing the needle on past the anus laterally and superficially, injecting

without distending nor distorting the area, a slight elevation ahead of the needle being sufficient; the injection is carried well into the anterior commissure; the needle is then withdrawn, and the procedure is repeated on the opposite side. The skin at the site of puncture will be found elastic enough so that these lateral injections can be carried on past the anus in a straight line. Again, nearly withdrawing the needle, the deep nerve areas in and around the sphincter are thoroughly injected on each side, the needle being carried deeply at two or three angles into both lateral deep areas; the test of insufficient anesthesia being any slight complaint of pain during the latter part of the deep injection. From one and a half to four ounces of anesthetic solution, with an average of two, have by this time been infiltrated throughout the area, absolutely without distention, and when skilfully injected has required from one and a half to two minutes only. The field is now presented for any type of operation desired in the whole anal and perianal area, with anesthesia complete and profound immediately at the end of the two minutes' injection.

The composition of the anesthetic solution is of interest and importance. Up to 1920 Martin had tried and discarded several anesthetics, and was using one per cent procaine (novocaine)—both with and without the addition of adrenalin; this solution was fairly satisfactory, but did not always produce profound anesthesia without distorting the field, and was lacking in the desired rapidity of action; however it proved to be more active when one per cent adrenalin was added. He tried in short series different combinations, for a time adding mercurochrome as an antiseptic and color agent, but discarded it as ineffectual and unnecessary as an antiseptic.

Years ago it was occasionally the practice to spray the nose with antipyrin solution before applying cocaine; thus suggested, he added antipyrin to the solution, and secured more immediate and pronounced anesthesia. Since then he never has experienced difficulty with the anesthesia lessening during the operation, and is unable to say just how long it does last.

In this series he has used procaine (novocaine), two per cent; adrenalin solution (1 to 1000), one per cent; and antipyrin, one per cent. This solution is just tinged with some color medium, such as methylene blue or a red color, to differentiate it from any other prepared solution (cocaine and procaine have a dangerous similarity of sound). He repeats, in other words: He has been injecting from fifteen to forty grains of procaine (novocaine), ten to twenty grains of antipyrin, and from ten to twenty drops of adrenalin solution (1 to 1000), in the production of each anesthesia.

It is possible to attain anesthesia following this nerve block with a weaker solution of procaine (novocaine) if speed and dependability are somewhat sacrificed, but he has found no reason after using two per cent, in this series, for lessening its strength. There is but occasionally confusion on the part of the patient, which may last from ten to twenty minutes following injection; this should cause no alarm and requires no treatment.

Two cases exhibited tetanic convulsive movements, lasting about five seconds; there were no other symptoms and no treatment was required; one was an alcoholic, and one a delicate and anemic young woman. No untoward experience and no toxicities, other than mentioned, have been met with.

The Etiology of Rickets.

PARK, in *Physiological Reviews* for January, 1923, states that no presentation of the etiology of rickets can be complete without a discussion of the peculiar susceptibility of the premature infant to rickets and tetany. Premature infants are usually kept in poorly ventilated rooms which are often superheated and dark; they are closely wrapped and are placed less frequently in fresh air and sunlight than are children born at term. These facts alone are not sufficient to explain the

frequency of the occurrence of rickets. The premature infant differs from the baby born at term in several particulars. He has low basal metabolism and is able neither to generate the heat necessary for nor to maintain normal body temperature; he has little subcutaneous fat and metabolizes fat poorly; in proportion to his size he grows with great rapidity. Hamilton has made important observations on the metabolism of premature infants. During the last three months of fetal life a storage of calcium takes place in the body of the fetus, and during the first few months of life after birth the infant is obliged to draw on this calcium depot. In contrast to the child born at term, the premature infant has no calcium depot (or a deficient one) and is destined to suffer from calcium-want provided calcium is not abundantly supplied in the food. The calcium which the premature infant receives in his breast milk, however, is not greatly in excess of the amount actually excreted. Hamilton's investigations suggest, therefore, that the frequent occurrence of rickets in the premature baby may be caused by a deficiency in calcium and possibly in phosphorus.

The suggestion of Hamilton may furnish part of the explanation. It seems probable, however, that the great susceptibility of the premature infant to rickets results chiefly from the immaturity of the organism and great impetus for growth. The premature infant cannot be regarded as normal and indeed does not overtake the child of the same conceptional age until five or six years have elapsed. Moreover, his growth stimulus is enormous. The premature infant must, therefore, be far more dependent on radiant energy than the child born at term and suffers more rapidly and severely when deprived of it. The child of four is more susceptible to rickets and develops the disease more rapidly than the adult, the child of one year than the child of four, the new-born baby than the infant of one year, the premature baby than the infant born at term, and the very small premature baby than the larger premature baby. According to Yllpö very small premature infants always develop rickets. The susceptibility to rickets varies inversely, therefore, with the age and culminates in the premature infant. To state the fact in another way, the susceptibility to rickets varies directly with the youngness of the organism or the speed of new tissue formation. A theory similar to the one just presented has been advanced by Yllpö to explain the frequency of occurrence of anemia in the new-born infant. Doubtless rickets and anemia are sister conditions, and both are an expression of the inability of the organism properly to discharge its metabolic functions when thrown on its own resources in an unfriendly environment without being properly prepared.

In 1906 Hansemann wrote one of the great papers on rickets, by far the greatest written on the etiology of the disease. Hansemann perceived that man in his struggle for existence against the forces of nature had created a whole fabric of abnormal conditions, and in so doing had altered his own habits and ways of living as completely as he had altered the habits and ways of living of the domestic animals which he had made dependent upon him. "Domestication," wrote Hansemann, "does not relate merely to those things which pertain to the house, as the derivation of the word might indicate, but refers to every effort on the part of man to further the survival of the race and of the individual by artificial means and to aid in the struggle against the forces of nature. By this definition it becomes at once apparent that not alone does man domesticate animals but has domesticated himself, a fact clearly recognized by Darwin." According to Hansemann, rickets is the direct result of domestication and a penalty that man pays for the artificial structure which he has created.

The writers on rickets seem to have

assumed that Hansemann's conception referred only to the environmental conditions of the individual; clearly his conception included also the food. The food which domesticated man eats is as far removed from the food furnished by nature as the conditions under which he lives are removed from the natural conditions. Recent progress in the understanding of rickets has served merely to give Hansemann's conception more exact definition. Rickets is indeed a price paid by man for his abandonment of a life out-of-doors and a natural diet for a life in houses and a diet of denatured foodstuffs; it is a sign of the operation of the immutable law of nature that nothing out of accord with her shall flourish.

Surgical and Genito-Urinary Therapeutics

Pulmonary Fat Embolism.

SUTTON *(Annals of Surgery,* November, 1922) observes that man normally has from 0.5 to 0.85 per cent of fat in the blood, increased by certain diseases—for instance, diabetes mellitus, nephritis, etc. There are two types of symptoms, pulmonary and cerebral. They may appear singly or in combination. In the pulmonary type the respiratory rate is increased and shallow; dyspnea soon develops, followed by cough and cyanosis; expectoration may be present and there may be blood in the sputum. The pulse-rate is increased, and the pressure is low. The radial pulse is very small in a great many cases. These symptoms may come on exceedingly fast. In one case reported by Bissell the respiratory symptoms began to appear during operation. The amount of liquid fat liberated into the blood-stream seems to determine the suddenness of symptoms.

There is a type of case in which the symptoms are dormant or absent for a time; later the respiratory symptoms appear. These may appear, then partly or wholly disappear, and reappear again in from five to twelve days with fatal result. This is explained as being due to fat passing through the pulmonary circulation into the general circulation and again collecting in the pulmonary capillaries. The temperature is of two types: In a case confounded with shock the temperature is normal or subnormal, and the skin and mucous membrane are blanched or ashen. In the majority of cases the temperature is elevated; in fact, it is quite the exception to have a normal or subnormal temperature. In only two of the fatal cases in the Mayo Clinic since 1916 has the temperature been normal. Often there is a sudden elevation of temperature before death. If there is bloody expectoration it is explained by the rupture of some of the capillaries of the lung. This produces hemorrhages into the bronchial tree, which are similar to the patches on the surface of the lung, in the form of small petechial hemorrhages.

When the fat passes through the pulmonary system and out into the general circulation, the central nervous system may receive an overwhelming amount in the form of emboli. A chain of cerebral symptoms follow, ushered in by restlessness, headache, uneasiness, mental dulness, stupor, and delirium. The delirium may vary from a mild type to a very disturbed state accompanied by hallucination. The reflexes are dulled, and tremor, convulsions, and paralysis have been reported. When the cerebral symptoms are predominant the diagnosis is often confounded with delirium tremens. The cerebral symptoms usually appear following the pulmonary symptoms, as a rule from two to eight days following injury.

Helpful aids to the diagnosis of fat embolism are the discovery of pulmonary

edema, invariably found on examination of the chest signs of bronchopneumonia at the bases, with the right ventricle dilated, small petechial hemorrhages in the skin over the chest, and blood-stained sputum containing numerous fat droplets. Fat droplets appearing early in the sputum is one of the newer signs of pulmonary fat embolism and should not be overlooked. Warthin found them the second day after injury. At necropsy the droplets may be found in the mucous exudate of the trachea and large bronchi. Associated with the fat droplets in the sputum there may be alveolar cells and phagocytes containing fat droplets. Globules of fat may be present in the urine. They are easily detected on the surface if the urine is held up to the light. The lipuria may appear at once; it usually appears at some time during the complication, but death from fat embolism may occur without lipuria.

Active treatment has not met with much success. Normal saline injected into the veins has been recommended. Schanz reports good results in the treatment of eight cases by this method. He injects the solution early into several veins, preferably a large vein. A two-per-cent solution of sodium carbonate has been recommended by Czerny; Minich believes this to be useless. Experimentally it does relieve the dyspnea. Wilms recommends drainage of the thoracic duct, and reports success by this treatment in one case.

Because of the extra strain placed on the right side of the heart by the increased resistance in the pulmonary circulation, one should use intravenous medication in small amounts. If large amounts of intravenous solution are to be given either in an attempt to dilute the blood or to "fix" the oil, as in the use of sodium carbonate, it would be better to precede such treatment with venesection. Stimulation and supportive treatment should be undertaken. Cardiac stimulants and heat should be applied to keep the blood flowing at as high a rate as can be maintained.

One outstanding point in the analysis of these cases is that an obese person undergoing a major operation, particularly if it is necessary to destroy fatty tissue, undergoes an added risk. In the greater number of cases the symptoms appear suddenly; they may develop even during the operation. A point of differentiation that has been made between shock and pulmonary fat embolism is that the symptoms of pulmonary fat embolism make their appearance later. This, as shown by the Mayo Clinic series, is not necessarily true.

Death from pulmonary embolism is relatively rapid. Most of the patients in the series died on the first, second, or third day after operation. Only one patient lived eleven days; one lived six days.

Fractures of the Leg.

COHN *(New Orleans Medical and Surgical Journal,* November, 1922) believes that the old diagnosis of sprain in injury to the knee is unjustifiable unless fracture has been eliminated by radiography.

Radiograms must be made in several planes, otherwise a small, incomplete, or even a complete fracture acting as a loose body in the joint may be overlooked.

When a patient with an injury to the knee presents a large amount of swelling which is soft and fluctuating, it is advisable to aspirate.

This fluid has often been of a bloody character. The advantages of aspiration are: Distention of the capsule is prevented. Such a distention, if permitted to persist, might lead to relaxation of the capsule and a consequent weak, wobbly knee.

There are no lymphatics within the capsule, hence absorption by natural methods would be slow. Complete intra-articular fractures, which are small, act as a foreign body and had best be removed. Early mobilization of the joint after such an operation is advisable. Incomplete fractures should be immobilized by the use of non-weight-bearing braces.

As to fractures of the shaft of one or both bones of the leg in this type of case

the treatment should be directed along the following lines: Non-operative procedures are desirable where possible. Of the non-operative methods, immediate reduction of deformity by traction, with aspiration at the time, and immobilization in plaster, or continuous traction and suspension, are the most satisfactory. Reduction is essential where there is displacement, because a persistent displacement produces a change in the axis of the limb and a consequent genu valgum. Continuous traction and suspension is the preferred method in cases in which traction will do no harm as suspension permits of early massage and mobilization of the joint, thus favoring an earlier restoration to the normal.

Occasionally one sees cases in which there is an associated pelvic injury. In such cases immobilization in plaster following reduction seems to be the method of choice. The after-care of these cases is most important. Early mobilization and massage prevent atrophy and contractures. After eight weeks have elapsed and callus seems firm, it is neither fair to the patient nor right to expect the injured knee to be capable of sustaining the body weight. Artificial aid is needed, and this is easily obtained by using the caliper brace.

One cannot generalize because these cases vary in type and degree. He may see incomplete fractures of one or both bones. In this type of case the treatment should be directed along the following lines: Immobilization. Frequent removal of cast for the purpose of giving contrast baths and massage as well as mobilizing the neighboring joints. Weight-bearing should be avoided until callus is firm.

In the treatment of all fractures of the leg, irrespective of the type, there are certain fundamental principles which must not be overlooked.

First, nowhere is restoration of normal anatomic relationship more important than in these fractures. Second, weight-bearing is dependent on the normal mortise of the ankle which results from the undisturbed relation of the tibial astragaloid joint. Third, anything which alters the normal axis of the tibia and fibula alters the relationship of the astragalus and the lower end of the tibia, and this interferes with weight-bearing. This point has within recent years received attention through the efforts of Dr. E. H. Skinner, who states that a plane which bisects the long axis of the tibia should bisect the astragalus.

The value of this can hardly be overestimated. It is interesting to find that Sir Percival Potts in 1769 attached great importance to the undisturbed ankle-joint for weight-bearing purposes. It is important also to appreciate the fact that angulation of the tibial shaft following an incompletely reduced deformity will materially interfere with weight-bearing.

As the foot is displaced forward by an angulation, complete reduction or as near as possible is essential for weight-bearing. The *x*-ray picture taken immediately after immobilization to determine the position of the fragments is essential.

By doing this, delayed operations, if operations must be performed, will be avoided. Operative interference, when decided upon, should be done early, because during the first ten days osteogenesis is more active than later.

In the incomplete type of fractures it is only necessary to apply a cast from time to time and have the patient given massage when the casts are removed, mobilizing the neighboring joints at the same time. A caliper brace should be worn for at least three months.

Of all the operative measures, the one which seems most valuable, particularly in the oblique or spiral fracture, is the Parham-Martin band. In practically all of the simple cases which the author has seen, it has been possible by non-operative means to reduce the deformity and to maintain reduction. Where there has been a great deal of primary swelling or skin irritation, a combination of suspension and traction has been used. One of the most satisfactory means of obtaining indirect skeletal traction has been the ordinary tennis shoe

with rings in the axis of the limb, to which traction straps can be attached.

Reduction having been accomplished, the cast should not be kept on longer than two weeks without removing the roof of the cast for inspection and massage. In the young, one can reasonably expect sufficient union at this time for the leg to move as a whole.

Massage, passive motion, resistive exercise and active motion are important elements in restoring the individual to his former muscular activity.

Too early weight-bearing is productive of pain and future trouble, which can be avoided by non-weight-bearing braces. The value of suspension methods should make them more generally adopted in hospital practice. Operative interference has been unnecessary in his experience thus far.

When the Diseased Gall-bladder Becomes Surgical.

CHAMBERLAIN (*New Orleans Medical and Surgical Journal,* November, 1922) gives the following indications as to when a diseased gall-bladder becomes surgical—first admitting that diseased gall-bladders do become surgical and that a diseased gall-bladder will eventually require surgical treatment for relief of symptoms.

In order that we may classify the various groups of biliary symptoms the scheme formerly suggested seems adequate.

The type in which all symptoms are gastric with nothing definite to direct one's attention to the right upper abdomen.

That in which symptoms are referred to the right upper abdomen.

Acute emergencies, such as empyema, gangrene, and common duct obstruction, not forgetting malignancy. The first two types present the greatest difficulty. The reason for this is due to the fact that for a long time gall-bladder lesions meant gall-stones. The sooner we forget that such is the case the sooner we can hope for improvement in the surgical therapy of biliary lesions. Do not wait for jaundice and colic to make a diagnosis; neither are nausea and vomiting more essential for diagnosis than is jaundice.

We have passed through the stage of "appendicular dyspepsias," and we are forced to believe that in 90 per cent or more of instances in which the symptoms are gastric the pathologic condition is remote from the stomach, and the clinical picture the result of reflex irritation arising from other portions of the gastro-intestinal tract. So far as we have been educated to the above-named dyspepsia, so are we coming to recognize the "biliary dyspepsia."

The diversity of symptoms relieved by surgical intervention in diseases of the biliary tract is too wide-spread to be explained by contiguity inflammation originating in the gall-bladder and ducts. Moreover, such an explanation can gain no support from the gross pathology observed during operative procedures. The fact remains, however, that patients are relieved of many and varied symptoms by dealing surgically with the local pathologic conditions of the biliary tract.

It is now well established that a gall-bladder which in the gross shows little evidence of a pathologic condition can cause a diversity of clinical symptoms, which are relieved by its removal. The liver often presents gross pathology in a considerable number of cases, the result of infection from the biliary tract.

The really important part of the investigation of these patients is a carefully taken history. This is often a difficult and formidable task, as we are dealing with patients who have a history of gastrointestinal disturbances extending over many years, so that many misleading answers to the usual questions are given, and one has to approach them from many angles. An inquiry as to the previous health of such patients will usually reveal a history of gastrointestinal upsets and bilious attacks beginning when quite young and continuing

with remissions until seen at consultation. One of the important physical factors to consider is, of course, not only the acute infection from which the patient has suffered, but also the chronic ones from which he may still be suffering, such as infected teeth, tonsils, or accessory sinuses.

Relationship Between the Ileocecal Coil and Arthritis Deformans.

REA SMITH (*Surgery, Gynecology and Obstetrics,* December, 1922), in his studies of chronic sepsis and the focal manifestations, again calls attention to the importance of the intestinal tract, particularly of the lower portion of the ileum, as a locus to which such infection may often be traced. He states that chronic polyarthritis in his opinion has its origin in a focal infection in the intestinal tract, due to an unbalanced or perverted intestinal flora, made possible by the failure of some part of the ileocecal coil to empty itself properly. From the careful and repeated *x*-ray examination of one hundred cases of arthritis and the abdominal findings in sixty cases, he has been able to draw some very definite conclusions as to the existence of an intestinal focus of infection, the nature of the intestinal deformity, and the method of its production.

Infections of the teeth and tonsils are undoubtedly the cause of many cases of acute arthritis, and their removal quickly clears up the symptoms. But in chronic cases the removal of tonsils and teeth has, as a rule, very little permanent effect, the reason being that an intestinal infection has taken place and a larger focus developed, so that then the clearing up of the head foci hardly affects the load of infection at all.

The similarity of the picture of the ileocecal coil in all of these cases has led us to the conclusion that the typical soil for development of arthritis is a congenitally mobile cecum which has been tacked back to the side wall of the abdomen by nature in an effort to lift up and anchor a prolapsing organ.

By a reduplication of peritoneum starting at the right colic artery and extending to the parietal peritoneum over the right kidney, the colon is rolled and folded so that it gives the appearance of an hour-glass, with the cecum thin-walled and toneless. There is usually a binding down of the ileum somewhere in its terminal 8 inches (20 centimeters), increasing the torsion in the ascending colon so that the physiological function of the colon is crippled and the cecum becomes an inert sac, which does not empty itself. This sac constantly filled with culture medium becomes infected with streptococcus, either from a head infection or from the terminal ileum, which is the natural habitat of the streptococcus viridans. The streptococcus becomes then the predominating colon organism and we have an overbalanced flora resulting, which, in its turn, becomes the focus of infection that keeps up the arthritic disease.

The most striking results following the removal of the right colon have proven to us the colonic origin of the disease. The removal of the right colon deprives the patient of his filter, and for ten days there is practically no water absorbed by the intestinal tract. It becomes necessary to give this patient water under the skin in order to prevent dehydration. His routine consists of giving a quart (1 liter) of salt solution daily by hypodermoclysis until the quantity of urine increases from 1000 to 2000 cubic centimeters. This happens usually from the tenth to the twelfth day. During this ten-day period the patient makes a wonderful recovery from joint trouble. In from forty-eight to seventy-two hours the swelling disappears and the joints become more and more movable and the pain entirely disappears; but on the day the quantity of urine doubles showing that the intestinal tract is again absorbing water, the symptoms recur. The perverted flora

is still able to act as a focal infection, and the joints then clear up slowly as the flora returns to normal. The removal of the right colon, however, in debilitated patients is rather a formidable procedure, and he has endeavored to develop a method of restoring the physiological function of the crippled cecum without its removal.

The interference with physiological function of the cecum is easily demonstrated by dividing the constricting band with a sharp knife at its junction with the parietal peritoneum. The ascending colon immediately rolls out until 3 or 4 inches (7.6 or 10 centimeters) separate the ends of the divided band, and the cecum regains its normal color and contracts on mechanical stimulation. He believes that the interposition of tissue is the most important step in preventing recurrence, and he uses free omental grafts to fill in all gaps and cover all denuded surfaces.

He has found the unpuckered mesoappendix, spread out and turned over toward the midline, most useful in covering the denuded surface developing on the mesentery of the ileum after the division of a "Lane's kink," and he believes that again the interposition of tissue is most important in preventing a recontraction of peritoneal surfaces and a redevelopment of the kink.

If there is no mechanical intestinal abnormality, but instead a general colon sluggishness, the after surgical treatment designed to reëstablish a normal intestinal flora, without surgery, will produce the same result. We have, in a number of cases, obtained great symptomatic improvement by this treatment without any surgical procedure. Other patients, treated medically without any improvement, have had an immediate relief of symptoms following a surgical procedure to remove the intestinal blockage, after which the same medical régime was resumed.

The joints become amenable to orthopedic treatment as soon as the pain subsides, and operations and manipulations can be carried out without fear of lighting up another attack of acute inflammation, which always hampers the orthopedic surgeon when he attempts any radical procedure in the presence of the infection.

Recurrent Renal Calculi.

BARNEY (*Surgery, Gynecology and Obstetrics*, December, 1922) after alluding to the fact that an operation does not necessarily remove all the stones, indeed that frequently one or more have been left, advises a careful *x*-ray study of all convalescents. He states that stones may be left in a kidney from which they were all supposedly removed with disappointing frequency, in spite of every means which one may adopt. It is therefore clear that a roentgenogram during convalescence is absolutely essential if one is to know the exact state of affairs before dismissing his patient as cured. The question now will be asked, What is to be done when this roentgenogram shows that one or more stones have been left behind? Should the patient be told the facts, and should a second operation be advised? With very few exceptions he believes it is desirable, and even necessary, that the patient should know the exact situation. If he is of average intelligence, and if the relationship between himself and the surgeon is all that it should be, this information will be accepted in the proper spirit. If the situation is not made clear an attack of renal colic or the spontaneous passage of a stone shortly after the operation may easily lead to an embarrassing situation.

The question whether a second operation should be performed is one which should be looked at from various points of view. In the first place the patient may refuse, in which case the incident is closed, at least for the time being. If the patient is a poor risk or for any reason took unkindly to the first operation, one would hesitate to submit him to further risks. If a nephrotomy has been done and convalescence has gone on without the advent of secondary hemorrhage the surgeon would, indeed, be bold

to advise the tempting of Providence a second time. Furthermore, the writer believes, although he has seen no case to prove it, the reopening of a previously nephrotomized kidney would very materially increase the amount of destruction to the organ which the first operation produced.

On the other hand, when the patient is agreeble to the proposition, if he is a good risk and stood the first operation well, if the kidney is not too inaccessible, and if the size, shape and position of the remaining stone or stones make the probability of subsequent spontaneous passage small, he would advise a second operation; having had occasion to so advise in several cases. He has performed the second operation ten days or two weeks later. By this time the patient is well over the effects of anesthesia, the possibility of infection is gone, and clots have become pretty well organized. On the other hand, adhesions are so delicate as to offer no hindrance to a rapid approach to the kidney, and one's only difficulty lies in the increased thickening of the various structures from edema and processes of repair.

Barney's experience has been that the recovery of stones at the second operation is apt to be easier than was expected, and he has had only one case in which a roentgenogram after the second operation showed the presence of stone. This case has been followed carefully, and the remaining stone has finally been spontaneously passed, aided meantime by the passage of a ureteral catheter on several occasions.

He concludes his paper as follows:

There is an unfortunate paucity of investigation on the matter of recurrent or overlooked renal calculi, and it would be desirable to have various observers in different clinics undertake such an investigation.

Roentgenographic examination during or very shortly after convalescence is essential for the accuracy of the results in such a piece of work.

While the few data which are at hand show that stones are subsequently found in the kidney after operation in a surprising number of instances, it is impossible to say which of these stones are "recurrences" and which are "left overs." Actual recurrence is unquestionably very frequent.

The complex character of the interior of the kidney, hemorrhage from its mucosa, and the comparative inaccessibility of this organ in many cases contribute to the difficulties in removing all stones.

Although various procedures may be resorted to for this purpose, none is infallible. It would appear that the fluoroscope offers the most promising prospects for success.

Preoperative study cannot be too painstaking, nor must the possibility of superimposed shadows of calculi be overlooked.

A second operation for the removal of remaining stones is advisable in most cases and should be done soon after the first operation.

Pyelotomy is unquestionably the operation of choice and is often advantageously combined with partial nephrotomy.

Resuscitation, Intracardiac Injections.

CRILE (DENNIS W.) in *Surgery, Gynecology and Obstetrics* for December, 1922, describes the case of a soldier from whom he was resecting the lower lobe of a gangrenous lung, during the course of which the heart became irregular and then stopped. Massage induced this organ to act again, but erratically, and it ceased again. Pricking the heart with a scalpel produced a response, but feeble and ineffective. Respirations had ceased and artificial respiration was being carried on, and was continued, together with cardiac massage, for fifteen minutes after the final cardiac failure. Crile states that he then injected directly into the left ventricular cavity 10 cc of adrenalin 1:1000 and gave the heart a squeeze, whereupon it began to beat firmly and with greater vigor than it had before. Respiratory efforts were not resumed for twenty minutes, but artificial respiration was continued for twenty minutes, and tracheotomy was then per-

formed and a catheter introduced into the right bronchus. To it was attached a tank of oxygen, which was allowed to flow with sufficient pressure to inflate moderately the right lung. The result of this was that the patient's color became a healthy pink. Twenty-five minutes after the first injection of adrenalin the heart again began to fail by dropped beats and incomplete systole. Ten more cc of adrenalin were given intraventricularly, whereupon there was a prompt return to full systole and regularity, followed shortly by efforts at breathing, at first irregular and becoming finally automatic and adequate. He continued to breathe for twenty-five minutes more, when the supply of oxygen failed. He then became cyanosed and the heart-beat weakened somewhat. Six hundred cubic centimeters of blood was transfused, and thereafter the heart, still held in the hand of the surgeon, dilated, fibrillated, and ceased to beat.

A second case is reported in which from five to eight minutes after the last audible or palpable heart-beat 20 cc of adrenalin hydrochloride were thrown with an infusion apparatus and washed into his venous system by a flow of saline. The heart began to beat at once, respirations returned, and the patient made a complete recovery. A further case is reported as follows: A man of seventy-two years was given spinal anesthesia for the removal of the prostate gland. Cardiac and respiratory failure occurred after about twenty minutes. No heart-beat was palpable, no pulse could be felt, no heart sound could be heard. Artificial respiration was done combined with extra-thoracic cardiac massage for a period of about fifteen or twenty minutes. During this time the author had made several attempts to puncture the heart, but was not able to aspirate blood, which one does to prove that the heart cavity has been reached before making the injection. He then discovered that the spinal needle which had been used was plugged. Procuring a new needle the intracardiac injection of about 5 cubic centimeters of adrenalin was made and epigastric massage was done. The heart beat faintly at first but stronger and stronger, until the radial pulse became full, hard, and regular. Artificial respiration was continued, and after a while a few respiratory efforts were made. However, the heart gradually failed again after perhaps twenty-five minutes, and nothing further was done. It is possible that had the intracardiac injection been made within the first five minutes, rather than after twenty minutes of complete cardiac failure, the patient might have recovered.

The mode of action in this treatment is presumably the same as adrenalin exhibits ordinarily. On reaching the heart auricle or ventricle, a forcible contraction occurs, emptying the auricular content into the ventricle, which then contracts (by the adrenalin action), filling the coronary arteries and expelling the ventricular contents into the aorta, where the adrenalin again acts, and thus arterial tension is developed. It may be, too, that the first auricular contraction regurgitates adrenalized blood into the great veins, contracting them and thus filling the auricle in its diastole.

The cycle having been thus established, each subsequent contraction pushes the adrenalized blood further into the arterial system, increasing tension as it progresses and soon reviving the cerebral circulation and the respiratory center. One should make the injection as quickly as possible so as to revive the cerebral circulation, since after an ischemia of more than eight to ten minutes the higher centers may be permanently destroyed.

Adrenalin (1:1000), a sterile spinal puncture needle, and a large glass syringe would be valuable additions to every operating-room.

It seems that the dose should be sufficient to insure the entrance of adrenalin into the heart cavity; that one cubic centimeter may be sufficient as recommended by

Kneier, or even only a few drops as recommended by Vogt. It is also worth while to know that 10 cc can be used successfully in adults, and the writer suggests a dose of from 1 to 10 cc, depending upon attendant conditions of time elapsed since cardiac failure, age of patient, size of patient, quality of adrenalin, and cause of apparent death. He does not recommend this procedure as a substitute for present resuscitation measures, but advises its use only after ordinary means have failed.

Transsacral Nerve Block Anesthesia in Surgery of the Pelvic Floor and Viscera.

MEEKER and FRAZER *(Surgery, Gynecology and Obstetrics,* December, 1922) in an important contribution on this topic give due consideration to the anatomy of the parts, which is most instructively and beautifully illustrated, discuss the various methods of producing anesthesia in the sacral region by local means, and describe their technique as follows:

The patient is placed in the ventral decubitus position with a cushion under his hips. This elevates the buttocks, partially flexes the hips, and serves to accentuate the bony landmarks. The horizontal position also promotes a more favorable diffusion of the fluid, for if gravity exerts an influence in causing fluid to escape through the anterior sacral foramina, it will continue to bathe the sacral nerves on the anterior aspect of the bone.

The cutaneous area around the sacrum and over the buttocks is sterilized in the same manner as for a laparotomy. It is first cleaned with benzene, and then painted with tincture of iodine, which is removed with alcohol.

With the index-finger of the left hand the tip of the coccyx is palpated in the anal groove. The finger then follows the posterior surface of the coccyx upward until the two sacral cornua are felt on either side. The cornua are the most prominent lateral tubercles encountered and are almost always definitely palpable. Location of the sacrococcygeal joint, by movement of the coccyx with a finger in the rectum, is useless and troublesome when such reliable landmarks as the sacral cornua are available. Somewhat higher in the median line the finger identifies the fourth sacral spine, indicating the apex of the triangle guarding the entrance to the canal. The obturator membrane forms a depression within these three points, and often gives the examining finger a sensation which has been compared to that produced by palpating a fontanel. With the finest hypodermic needle a dermal wheal is raised in the center of the sacral hiatus, and the underlying subcutaneous tissues and the obturator membrane are infiltrated so that the passage of the larger needle will not cause pain. A spinal puncture needle of small caliber is then introduced through the skin with the bevel upward and at an angle of about 20 to 30 degrees with the skin surface. There is a sensation of increased resistance as the sacrococcygeal ligament is reached, and when this is perforated the point of the needle impinges against the bone of the anterior wall. Whenever the needle is felt to pierce a dense membrane, pass through a free space, then come in contact with bone, there is no doubt but that the sacral canal has been entered. The needle is then withdrawn 1 or 2 millimeters and depressed about 20 degrees farther until approximately parallel to the sacral canal. It is then advanced gently and slowly about 3 to 4 centimeters into the canal, and usually passes readily. If bony resistance is encountered, the needle should be rotated, depressed at its base, and either raised or lowered at the shoulder, being thus gently manipulated until the bony resistance is passed. The stylet is then withdrawn, leaving the needle in place. If it has entered one of the large veins or the dural sac, it should be slightly withdrawn or its position changed until the blood or spinal fluid ceases to appear. The syringe is then connected and the injection made very slowly and gently. The needle is withdrawn as the injection progresses until 20 to 30 cubic centimeters of the novocaine

solution has been injected, when the tip of the needle is just inside the obturator membrane.

The crest of the ilium is then palpated and followed posteriorly until the posterior superior spine is located. The most prominent point of this spine is then determined and a dermal wheal made about 1.5 to 2 centimeters inward and about 1 centimeter downward. This point should lie above the second sacral foramen. Another wheal is made just below and lateral to the sacral cornu which locates the fifth foramen. The distance between these foramina is then divided into three equal parts by two more dermal wheals, which mark the position of the third and fourth foramina. Another wheal is then placed in line with these four and above the first, usually about 2 to 2.5 centimeters, for the location of the first sacral foramen.

The thickness of the soft tissues overlying the sacrum is much greater above and decreases downward, which necessitates the employment of needles of different length in searching for the various foramina. Less discomfort is given the patient when the smallest needle possible is employed in probing for a given foramen.

With an 8-centimeter needle the anesthetized skin is perforated over the second foramen. The needle is then inclined somewhat downward until it is thought to be perpendicular to the tangent of the sacrum at that point, and slightly inward. It is then gently advanced until it either comes in contact with the bone or passes through the foramen. If it comes in contact with the bone, it is gently withdrawn and another search for the foramen is made. In this way the distance from the skin to the periosteum is estimated, and when, after repeated attempts, the needle seems to perforate a membrane, advances farther than before, and still does not encounter bony resistance, it has passed into the foramen. It is unusual to insert the needle directly into the foramen at the first attempt. If this does occur, it is probably better to withdraw the needle, direct it somewhat more obliquely, and locate the margin of the bone more superficially. It is thus verified that the first position was correct, and it only remains to reinsert the needle in the original location.

The needle in the foramen is usually left in place to serve as a guide while search is made for the third foramen. A 5-centimeter needle is employed for the three lower foramina. After injecting the third and fourth foramina the 10-centimeter needle is inserted into the first foramen. This foramen lies deepest of all and prolonged search is often necessary for its location. In order that the needle may advance perpendicularly to the plane of the sacrum, it must be inclined more to the skin surface than in the other foramina. After the upper four foramina have been injected, those of the other side are located and injected in the same manner. When both sides have been injected the skin over the coccyx is tested for anesthesia with a clamp. If it is insensible to pain, the fifth sacral foramina are not injected; otherwise they are injected in the manner already described.

The greatest pain in searching for foramina is caused by making the dermal wheals. This is but transitory and usually well tolerated. In highly sensitive individuals the point of entrance of the needle may first be anesthetized with ethyl chloride, but this is ordinarily unnecessary. While making the initial stick the thumb should be on the plunger so that at the moment the needle enters the skin the solution can be injected. In this way the puncture is often made without the patient's knowledge. When the needles are sharp and bright there is no further pain, unless the periosteum is roughly probed. Besides causing pain this thrust also bends the point of the needle to a hook, so that it tears the tissues when withdrawn and requires more force for penetration.

The amount and strength of the procaine-adrenalin solution employed varies with the size and general resistance of the patient. For greatly debilitated patients, and for relatively poor surgical risks, a solution of 0.5-per-cent strength is used.

The amount is then gauged more or less on the probable size of the sacrum. From 20 to 40 cubic centimeters of the solution are injected into the sacral canal; then the sacral foramina are injected according to their size and the size of the nerve trunk to be blocked. The greatest amount should thus be injected into the first foramen and the quantity for each successive foramen reduced by 1 cubic centimeter—that is, 7, 6, 5, 4, and 3 cubic centimeters respectively. From 75 to 140 cubic centimeters of the 0.5-per-cent solution has given uniformly complete anesthesia. When one per cent is employed in robust individuals, 20 to 25 cubic centimeters are injected into the sacral canal and the posterior foramina in the same ratio as with 0.5 per cent. From 60 to 110 cubic centimeters of one-per-cent solution have in all cases produced complete physiological block. Ten minims of epinephrin for each 100 cubic centimeters of solution are used in all cases.

From November, 1920, to May, 1922, transsacral nerve block anesthesia has been employed in the Mayo Clinic in 225 consecutive operations on the pelvic floor and its viscera. This series does not include cases in which transsacral block has been used with lumbar paravertebral anesthesia in resection of carcinoma high in the rectum, in vaginal hysterectomy, or those in which it was combined with abdominal wall field block for suprapubic prostatectomy. In the entire series preliminary narcosis was very light, often exerting no noticeable effect. Anesthesia was complete in 222 cases, while some pain was experienced at operation in three cases, although inhalation narcosis was not resorted to. In these three cases 0.5-per-cent solution was employed, which probably was not strong enough.

Of the relative indications for local anesthesia twenty-one patients had a "cold" on the morning of the operation. Transsacral block was used for the second operation in forty-one patients in the hospital convalescing from laparotomies. Thirty-two patients were given local anesthesia because of their poor general condition, due to senility, arteriosclerosis, and varying degrees of chronic nephritis and myocarditis. There were two diabetics who were sugar-free at the time of operation. There were five cases of marked anemia, two of pernicious, and three of severe secondary anemia; all these patients had had previous transfusions. Six patients were obese women, each weighing more than 200 pounds. The list includes five patients with clinical pulmonary tuberculosis; in two the condition was diagnosed as active at the time of operation. Only sixteen patients of the series had requested local anesthesia.

There were no postoperative pulmonary complications and no deaths in the entire series. Twenty-four patients had to be catheterized after operation (about 8 per cent), and twenty patients had retention catheters inserted at operation. Vomiting did not occur either during or after operation, and in most instances the patient was immediately placed on a normal diet. In the more severe cases diet was restored progressively in from one to three days after operation, depending on the general condition of the patient and type of operation performed.

Complications referable to the anesthesia are tenderness over the sacrum and mild toxic symptoms. In about 15 per cent of cases there has been soreness and tenderness over the sacrum for the first two to four days. This was at times so distressing as to cause the patient to lie on his side. No special care, such as applications and dressings or the use of air cushions, has been given the sacral region after anesthesia. There have been no cases of infection in the sacral region.

Toxic symptoms, when they occur, are mild and of no consequence. They consist of pallor, palpitation, perspiration, and sometimes a feeling of giddiness. When dealing with such mild symptoms it is not always easy to differentiate nervousness and

toxicity. There have been no cases of vomiting, rigors, convulsions, syncope, or collapse.

The extent of anesthesia by block of the sacral nerves is best appreciated by a consideration of the variety of operations that have been painlessly performed under it. In surgery of the rectum it has been employed in hemorrhoidectomy, the usual type of operation being clamp and cautery of internal hemorrhoids and excision and suture of external hemorrhoids. Relaxation of the sphincters and muscles of the pelvic diaphragm are features especially favorable to surgery of the terminal rectum. Plastic operations on the anal sphincters, removal of rectal polyps, amputation of the prolapsed rectum, dilatation of rectal strictures, and excision of specimens from rectal tumors for diagnosis have been repeatedly performed under sacral nerve block. It has also been employed in posterior resections of cancer low in the rectum with removal of the coccyx and fifth sacral segment. It is usual in resection of cancers higher in the rectum to block the three lower lumbar nerves as well, although carcinomatous growths 5 centimeters from the anus have been painlessly removed under sacral nerve block alone. Both the single-stage resections with sacral anus and the two-stage resections after preliminary colostomy have been performed.

Gynecological operations have included perineorrhaphies, the Bovee operation for cystocele, trachelorrhaphy, dilatation and curettage, removal of cervical polyp, dilatation of the vagina in vaginismus, excision of vaginal tumors, and removal of cancer of the rectovaginal septum. External urethrotomy and plastic repair of perineal urinary fistula have been performed in the male. The anesthesia is also sufficient for perineal prostatectomy, although it has not been employed in this operation at the clinic. Multiple infected perineal sinuses and postanal pilonidal cysts have been excised and the coccyx removed for coccygodynia. In urology it has been employed for anesthesia of the bladder, prostate, and urethra after epidural anesthesia alone has been found insufficient. For more superficial work on the perineum, as hemorrhoidectomy, anal fissures, plastic work on the anal sphincter, and anal fistula, block of the four lower sacral nerves alone is sufficient. For operations involving deeper structures, as resection of the rectum, vaginectomy, perineorrhaphy, operations on the cervix, and prostatectomy, all five sacral nerves are blocked.

The extent of anesthesia involves the entire pelvic floor and all structures lying below the pelvic peritoneum. The more dependent part of the pelvic peritoneum is also anesthetized, so that it may be opened painlessly; but any great pull on it may be transmitted outside of the area of anesthesia and produce pain. For this reason the anesthesia is insufficient for a resection of cancer high in the rectum, for vaginal hysterectomy, or for the Watkins interposition operation.

Contraindications to transsacral nerve block anesthesia include deformities and anomalies of the sacrum in which it is impossible to enter the foramina. Only two such cases have been found. It should not be attempted in suppurative infection of the skin and subcutaneous tissues of the sacral region because of the risk of spreading infection. In three cases transsacral anesthesia was not attempted because of this condition. Malignant disease of the sacrum and overlying tissues should also constitute a contraindication. Although obese, very nervous, and hysterical patients are difficult to handle, transsacral nerve block is not contraindicated in these patients.

Extrapleural Thoracoplasty in the Treatment of Tuberculosis.

BULL *(British Medical Journal,* Dec. 23, 1922) states that since 1914 he has operated upon 75 patients suffering from pulmonary tuberculosis. He states that extrapleural thoracoplasty belongs to the same category

in the treatment of pulmonary tuberculosis as artificial pneumothorax; both aim at a collapse of the lung with resulting retraction on account of the increased development of connective tissue, and thereby healing. As, however, artificial pneumothorax is less risky than thoracoplasty, Bull demanded as a rule that inflation shall have been employed either without result, or unsuccessfully on account of extensive adhesions, before the patient is advised to have thoracoplasty. On the whole it may be said that the indications for thoracoplasty coinicide with the indications for artificial pneumothorax, and that the former should be employed when the latter cannot be used.

As regards the so-called "healthy" lung, it should be required that there are not, nor have been, demonstrable clinical symptoms in that lung, or that such symptoms in any case have quite disappeared, or, during a long period of expert observation, that they have remained stationary and of slight extent. Even though there may be little or nothing to find clinically in the "healthy" lung, it happens not infrequently that in the *x*-ray photograph we can find such extensive changes that an intended operation has to be abandoned. An *x*-ray examination of both lungs is therefore absolutely essential.

A slight tuberculosis of the larynx is not a contraindication of operation, as it may well be assumed that any further improvement in pulmonary tuberculosis, with diminished cough and expectoration, will have a favorable influence upon the laryngeal tuberculosis, in analogy with the improvement in tuberculosis of the bladder after removal of a diseased kidney. Neither does tuberculosis in one kidney constitute an absolute contraindication. Absolute contraindications are found in an advanced stage of tuberculosis in the other lung, and the general contraindications which militate against any serious operation.

An extremely important point in costal resection is that the ribs ought to be resected as far back as possible—that is to say, far beyond the costal angle, right up to the costal tubercle, and the point of the transverse process. It is almost thirty years since the Frenchmen Boiffin and Gourdet emphasized how important it is in the treatment of chronic empyema to remove the posterior parts, which are the stiffest and most curved part of the ribs; if we remove only the posterior part, the anterior part of the ribs, on account of the flexible costal cartilage, will easily be pressed inward toward the thoracic cavity and the costovertebral angle will to a large extent be effaced. It is this principle in costal reaction which has now been transferred to extrapleural thoracoplasty.

Two patients died after the first stage of the operation, but 50 survived both stages—a mortality of about 4 per cent. Of 21 patients in whom the operation was performed in one stage, 6 died—a mortality of about 30 per cent.

As a rule from two to three weeks should elapse between each two stages of the operation.

Immediately after the operation there was observed a marked collapse of the thoracic wall with paradoxical respiration, the mobilized part of the thoracic wall being drawn inward during inspiration and pushed outward during expiration. Dyspnea, troublesome expectoration, and pains in chest, radiating to the shoulder and upper arm, especially trouble the patient during the first days after the operation. The dyspnea is partly due to "mediastinal flutter," partly to the labored action of the heart on account of the displacement. The heart has to grow accustomed to the latter before it can act normally.

Expectoration must be relieved. This is done in various ways. An extra nurse remains with the patient day and night in order to support the operated side during attacks of coughing, and in order to encourage him to expectorate. A good compressing bandage is of importance both as regards the cough and in order to produce collapse of the operated side. But above all it is important to give the patient sufficient narcotics, morphine or omnopon, in order to relieve pain and thereby facilitate expectoration, and moreover narcotics have

a beneficial influence upon an eventual "mediastinal flutter."

The amount of sputum diminishes often while the patient is still in hospital, and in a number of cases it diminished in the course of a few weeks from 150 grammes in twenty-four hours to 30 to 25 grammes or even to zero. As a rule a rapid diminution in the amount of sputum is a good but not completely reliable prognostic sign. At the same time that the amount of sputum diminishes the number of tubercle bacilli also diminish. Frequently on a patient's discharge from hospital we may find only a few or even none, even if on his arrival at the hospital his sputum swarmed with tubercle bacilli.

The temperature often remains high and the pulse frequent for four or five days, but in cases progressing favorably it then falls to about normal; at the same time the pain also diminishes considerably. The patient soon begins to feel better and is especially gratified because the cough is so much less troublesome. The large wound almost always heals by first intention, and the patient, even two or three weeks after the operation, can begin to sit up, or if the operation has been performed in two stages, five or six weeks after the first operation.

The operated side of the thorax falls in considerably, so that the anterior margin of the scapula can be seen from the front. With the cystometer we can measure a diminution of the operated side amounting to 5 or 6 cm., or up to 10 cm. We can feel distinctly how the anterior ends of the resected ribs approach the posterior ones, so that the distance between them decreases from 12 to 15 cm. to 5 or 6 cm., 3 or 4 cm., or even less. At the same time the anterior ends move downward, so that, for instance, the anterior end of the seventh rib rests opposite the posterior end of the eighth rib.

There develops scoliosis of the spinal column with the convexity toward the diseased side—the reverse of the post-empyemic scoliosis—presumably because at the operation we cut or paralyze a larger or smaller part of the long back muscles; the muscles on the healthy side therefore gain the supremacy, so that the spinal column is bent convexly toward the operated side. The mobility of the arm is at first greatly restricted on account of pain, but by degrees it returns, except where the scapula has been entirely fixed. On the whole it may be said that the permanent incoveniences of the operation *per se* are slight.

The author notes that he has had 46 cases of left-sided pulmonary tuberculosis, one death from operation, and out of 29 right-sided cases 7 deaths.

Sixty-four patients have been under observation for more than one year up to eight years after operation. Thirty-eight are still alive, 26 are dead; 25 of the living have no symptoms and are more or less able to work; 9 are tuberculous; and the result is undecided in the case of 4. Of the 26 deaths, 5 were due to the operation, 20 to tuberculosis, and one to influenza. The immediate mortality resulting from operation is 10 per cent, and the number of cures after operation amounts to one-third.

The concluding points which the author makes in his paper are as follows:

In unilateral or mainly unilateral pulmonary tuberculosis which is not cured by rational expectant treatment or pneumothorax, good results can be achieved by means of extrapleural thoracoplasty.

The operation should be performed only after an exhaustive conference with the physician treating the patient, who must have been enabled, by observation during a considerable period, to form a considered opinion of the prognosis with continued expectant treatment.

Resection of the ribs should be carried out, under local or general anesthesia, through a paravertebral incision so that the posterior part of the ribs from the eleventh, or in any case from the tenth, to the first inclusive can be removed.

If a cavity remains, it can be brought to collapse by means of intrathoracic transplantation of fat.

Reviews

THE PATHOLOGICAL PHYSIOLOGY OF SURGICAL DISEASES. A Basis for Diagnosis and Treatment of Surgical Affections. By Professor Dr. Franz Rost. Authorized translation by Stanley P. Reimann, M.D., with a foreword by Dr. John B. Deaver. P. Blakiston's Son & Company, Philadelphia, 1923. Price $6.

Medical men are too prone to think of pathology as identical with morbid anatomy, when in reality pathology is morbid physiology and morbid anatomy is a study of dead tissue. It is apparently with this distinction in mind that the author, who is a Professor in the University of Heidelberg, prepared his text, pointing out that in surgery, as in no other branch of medicine, the pathological changes are actually seen and recognized, that the surgeon disturbs the various mechanisms of the body by his procedures, and, in cases operated on too late, he sees the final picture. There is no question of the importance of these subjects, and, furthermore, as Rost says, technique alone does not make a good surgeon. To it must be added the faculty of judging the strength of the patient in reference to the severity of the proposed operation and the courage and knowledge to deal with unforeseen circumstances, which means the ability to determine swiftly the most suitable treatment. The translator points out that he has not attempted a literal translation, which is advantageous. He gives us a readable text in which all the information contained in the original German is to be found.

The book contains twelve chapters, which deal with the oral cavity and its adjacent organs, the stomach, pancreas, liver and gall-bladder, the spleen, peritoneum, intestines and genito-urinary organs, the thyroid gland, the chest cavity, the brain and spinal cord, and the extremities. At the close of each chapter a copious bibliography is appended. As might be expected this is almost entirely Teutonic, there being very rarely any reference to French, English or American literature. The volume closes with an index of authors, which seems rather unnecessary in view of the fact that the author's name is appended to each reference in the literature. There is a very adequate index to titles covered in the text.

The book is one which can only be used by the advanced student and graduate, who will, however, find in it a large amount of information which will explain puzzling problems already met with. It also points the way to making clear other problems which may come to his hand in the future.

THE RIDDLE OF THE RHINE. By Victor Lefebure. E. P. Dutton & Company, New York, 1923. Price $2.

This book deals with chemical strategy in peace and war and is an account of the critical struggle for power between nations, with particular reference to the campaign fostered by the great Rhine factories. Its author is a distinguished Officer of the British Empire and a Fellow of the Chemical Society. The book opens with a preface by no less a person than Marshal Foch, and with an introduction by Field Marshal Sir Henry Wilson, Chief of the Imperial War Staff.

The author had a unique experience in chemical warfare in all its aspects: first, with the first combatant gas unit on the British front in France, and later as liaison officer with France and other allies in all chemical warfare. Furthermore he has a close association with the dye industry and is able, as Marshal Foch says, to give an exact idea of the possibilities of to-day of Germany as a danger which may still threaten the civilized world.

Foch strongly recommends that this book be widely read, not only by military men,

but by civilians as well, so that they may gain a clear idea of this danger which still exists for the world.

There are a number of interesting illustrations in the volume and interesting chapters describing the various forms of poison gases, the first cloud gas attack of the war, the reaction of the allies to this form of military procedure, the methods of producing the gases, American developments along these lines, and a special chapter dealing with the German chemical policy and showing how the use of drugs used in medicine and chemicals used in the arts provide funds and equipment by which factories and laboratories can be changed into gas producers for warlike purposes at little expense and effort. Emphasis is also laid upon the fact that chemical disarmament was neglected in the Treaty of Versailles.

The book is well written and deserves to be studied by all those who are interested in war or in peace—and this means every one.

THE MEDICAL CLINICS OF NORTH AMERICA. January, 1923. Philadelphia Number. W. B. Saunders Company, Philadelphia, 1923.

This is Volume VI, No. 4, of the Medical Clinics of North America, and, as indicated, is composed of contributions made by Philadelphia physicians. The opening article is one by Dr. McCrae of the Pennsylvania Hospital and Jefferson Medical College upon "Hypertension in Nephritis and the Early Treatment of Empyema by Aspiration." There are other clinics by Dr. James M. Anders; one upon "Coronary Thrombosis," by Dr. Riesman; another upon "Syphilis with Pulmonary Manifestations," and still others by Musser, Mohler, Wolferth, Chevalier Jackson, Weiss, Crawford, and Harold W. Jones. All of them, of course, deal with medical themes.

We notice with interest, in view of the present trend to bring clinical medicine before medical students in the early years of their studies, that O. H. P. Pepper gave a clinic to first-year men on diabetes mellitus with a discussion of the buffers of the blood and upon septic meningitis secondary to otitis media.

There is no question that while these individual subjects may be rather advanced for first-year students, there has been too much of an attempt to make the first and second years so dry and far removed from practical medicine as to discourage medical students in the early stages of their curriculum, and we welcome any attempt to bring bedside medicine and proper teaching in closer connection than heretofore.

A REFERENCE HANDBOOK OF THE MEDICAL SCIENCES. William Wood & Company, New York, 1923. Price, $80.

Hundreds of medical men are familiar with this very notable contribution to medical literature, the first edition of which appeared about thirty-five years ago, was revised in 1894 and again in 1900. In 1908 a revised appendix was published and afterwards incorporated in Volume VIII. So, too, in 1911 a further demand for the book resulted in a completely revised edition being issued.

To those who are unfamiliar with previous editions we may call attention to the fact that everything in connection with medicine is included, the intention being that the general practitioner, the internist, the surgeon and the laboratory worker will all find in its pages information useful to them. While many of the articles have been revised by contributors to earlier editions, a very considerable number of new contributors have, of course, been added.

There are no less than 3914 articles in the eight volumes, varying in length from a few lines to twenty or more pages, contributed by 445 medical men, and, furthermore, there are over 5000 engravings in the text and 64 full-page plates in colors and tint.

When one of the earlier editions appeared the THERAPEUTIC GAZETTE used the following words in regard to it: "The physician who possesses this noteworthy contribution to medical literature may feel

that he has in the eight volumes a whole medical library, dealing, too, with the collateral sciences, and that the matters discussed are thoroughly up to date."

The editor, Dr. Thomas L. Stedman, the publishers and the contributors are to be congratulated upon the completion of this new and very noteworthy contribution to medical literature.

IMPOTENCY, STERILITY AND ARTIFICIAL IMPREGNATION. By Frank P. Davis, Ph.B., M.D. Second Edition. C. V. Mosby Company, St. Louis, 1923.

In this book there is a discussion on sexual instinct as influenced by the sense of smell and of sight and of hearing. Impotency in its various forms is discussed. There is a chapter devoted to sensuality in women, one to masturbation and emissions, one to the treatment of impotency, one to race suicide, and two to sterility and its treatment.

The chapter on artificial impregnation refers to a distinguished Philadelphia surgeon, long since dead, excepting for his lasting contributions to science, and refers to him by name as having injected into the uterus of a woman under an anesthetic semen from the "best looking man of the senior class" attending the demonstration, this without the knowledge or consent of the woman, but afterwards with the approval of the husband, who was told what had been done.

There is a final chapter on therapeutics, in the course of which the author states that at one time he prepared for a patient suffering from rheumatism an alcoholic tincture of the common black ant; this medication had no beneficial effect upon the rheumatism, but the patient did complain of painful erections without sexual desire.

Those who love to dwell on sexual topics will find entertaining reading in this book; and certain statements given as fact which will not meet with universal acceptance. Thus, it is noted that a widely dilated pupil is an indication of amorousness, this being the reason that women use belladonna to produce this effect. "The custom of using depilatories for the removal of the hair from the axilla does away with much of the sexual odor. Women who remove the hair from under their arms are never so attractive as those who do not." It is further stated that highly sexed women have an abundance of hair not only upon the head, but upon the body as well, and that heavy eyebrows are indicative of sexual power in the female. "The pubic hair is thick and curly in the highly sexed woman, and the degree of passion may be judged by the abundance of hair and the closeness of the curls." The majority of cases of frigidity have long straight pubic hair.

The author of this book attaches large importance to the glands of internal secretion as a contributing factor to sexual potency, and firmly believes that both psychic and physical stimuli are essential to the full development and expression of sexual power.

ESSENTIALS OF SURGERY. By Archibald Leete McDonald, M.D. Illustrated. Second Edition, Revised. J. B. Lippincott Company, Philadelphia and London, 1923. Price $2.50.

Among the many texts prepared for such proper grounding of nurses in the essentials of surgery as is needful for their intelligent coöperation in the care of patients, this book easily ranks first. It also ranks first as a guide to the physicians who teach nurses.

In training schools there are usually given to the nurses lectures on surgery by surgeons which are discursive, lacking in sequence, without proportion, and casual. Any surgeon who will be guided by McDonald's book will turn out a class well equipped so far as knowledge of the subject is concerned to render efficient service. The author has a fine sense of proportion and a gift for lucid expression. At the end of each chapter there are listed demonstrations wisely selected and each convincing in its nature. This book, if properly used, would do away with the didactic lecture, which, as a rule, is for the nursing class

simply a task in mnemonics; and would put the teacher in his true place—*i. e.*, that of explaining and elucidating a text which the student should master before attending the demonstration. The universal adoption of this book in training schools would in many cases be even more educating to the doctor than it is to the nurse.

This is a manual deserving of the highest commendation and a distinct contribution to the broad concept of the education of the nurse.

Notes and Queries

The Immigration Question.

"The Girard Letter" for March, 1923, published by the Girard Trust Company of Philadelphia, states that no other legislation pending in America has more possibilities of danger to the country than that which aims to cut down still further foreign immigration of persons suitable for ultimate good citizenship.

The Johnson bill would, if enacted into law, reduce the number of aliens who could come here to two per cent of the number that were here in 1890. The law now in effect fixes the quota at three per cent of the number in the United States in 1910.

The Johnson act, by going back thirty-three years for a basis of calculation, would reduce the number of aliens who might come to America by more than fifty per cent.

Last year the number of immigrants who were admitted to this country was 358,000.

The pending Johnson act would limit the eligibles to about 168,000 in a year.

This question then presents itself to industrial America: Can our country grow and prosper on such a limited supply of new labor?

How serious is to be the effect produced by this cutting off of new hands in agriculture, manufacturing, and railroading?

Scarce labor means dear labor, and dear labor as inevitably means a higher price for food, for building, for every output of mine, farm and factory as well as for transportation.

There is now reported in nearly all parts of the United States a lack of workers. The head of an important industry which needs twenty per cent more employees than it can now obtain estimates that the labor shortage of the United States is at present 600,000 men.

During the deflation period in 1921 there appeared to be a large surplus of labor. It was only temporary. The revival of business of every kind last year quickly caught up the whole available supply of workers, and still there was a demand for more.

This call for men was instantly reflected in a stiffening of wages. It was also shown in the failure at the coal mines and on the railroads to reduce wages as it was expected in 1921 they would have to be reduced in order to meet other economic conditions.

When the largest manufacturer of steel in the world last year felt obliged to advance the pay of unskilled labor, it was a clean-cut signal that the supply of such labor was exhausted.

For about 70 years the United States has depended largely upon immigration to furnish the necessary army of unskilled labor to carry on our industries successfully. To cut down that inflowing army now to a point where the total arrivals would be less than 175,000 would raise a menace so vast that it is difficult to exaggerate the possible consequences.

The campaign to reduce the foreign influx of labor to less than one-seventh of what it was fifteen years ago is usually masked under a pretense of Americanism.

Those advocating these restrictions say that it is necessary for the United States to stop the inflow of new blood. They

insist that immigration threatens our American institutions. They think the United States has reached the saturation point and cannot assimilate any more alien peoples.

If the United States 70 years ago could find a place in one year for a new alien for every 60 residents of this country, is it crowding the country now to admit one alien for every 300?

The Johnson act would cut the number to about one immigrant for every 700 of our population.

Constructive operations in all directions require an adequate force of labor. Our mining industries especially have depended heavily upon the unskilled workers who came from Europe.

All over the country there is complaint from farmers of an inability to procure men.

Builders in every city know that a scarcity of both skilled and unskilled labor not only greatly increases the cost of every operation but actually prevents others from being started.

The wages now paid to plasterers, stone masons, bricklayers, carpenters, painters, plumbers and paperhangers means higher costs for him who builds a home.

[And in the South the negro population is leaving the cotton fields for the wages they can get in the North, because immigration is stopped to a large degree by the law already in existence.—ED.]

Mosquito Netting.

MacArthur, in the *Journal of the Royal Army Medical Corps* for January, 1923, believes that cotton netting of 25/26 holes to the square inch, and woven of 30/s, or 40/60, cotton, will exclude mosquitoes when used as a mosquito curtain under natural conditions.

As regards screencloth, he thinks that screencloth of 14 mesh to the inch and 30 I. S. W. G. should suffice to exclude mosquitoes from buildings. As is well known, the eggs of *S. fasciata* can withstand drying for long periods, and they may subsequently be washed into tanks and other containers when rain comes. Such receptacles should be screened with 18 mesh gauze, as freshly emerged *S. fasciata* might struggle through a coarser mesh before their exo-skeleton sets. Mosquitoes at this stage do not suck blood.

If buildings are screened with unnecessarily fine screencloth no harm is done, for this material is more or less of a fixture and cannot be discarded at the will of the individual. There is grave objection to the use of cotton netting any finer than is absolutely necessary, as will be realized by medical officers who have experienced the difficulty of inducing troops to remain under their nets at night, especially in a hot, steamy climate. The finer the mesh, other things being equal, the greater is the temptation to discard the nets.

There is need for further observations on the mesh necessary to exclude mosquitoes and "sandflies," respectively, not in laboratory tests but in actual practice. We are not concerned with what mesh a frenzied mosquito imprisoned in a test tube may struggle through in order to escape from captivity, but with the mesh that a free mosquito will pass under natural conditions to obtain food. Any medical officer with a working knowledge of netting could carry out most instructive experiments in infested districts. Owing to the many possible sources of error, the tests would have to be very carefully carried out, and in order to attribute any importance to the presence of mosquitoes inside a net it would be necessary for the observer to have seen them himself actually coming through the mesh. If it is true that a mesh of about 40 to the square inch is necessary to exclude *S. fasciata,* his vigil under a net of 25-hole mesh should not be a very lengthy affair.